UK METEOROLOGICAL OFFICE
GLOBAL DATA MONITORING REPORT

December 2003

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Meteorological Office
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1. Introduction

As the WMO-appointed lead centre for monitoring surface marine data, the U.K. Meteorological Office produces monthly statistics on the quality of these observations received at RSMC Exeter. This report includes this information along with statistics for most other types of data. The figures and tables contained herein are presented according to the agreed standards for the exchange of monitoring results.

The report is based on data received at the UK Meteorological Office Headquarters, Exeter in time for inclusion into the appropriate analysis (the current cut-off time is approximately 7.2 hours after each analysis time). The evaluation of data quality is based on comparison with the appropriate 6-hour global model forecast (background) field, although to provide background values valid at the observation time for non-main hour data, time-interpolation of the T+3, T+6 and T+9 forecasts is used; and for sea surface temperature the background field is the analysis from the previous day. Generally, the background field is of high quality except in data sparse areas, tropical regions and areas close to steep orography where care should be taken in interpreting the statistics shown.

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2 Global Data Monitoring Statistics

Ships, Fixed buoys, Platforms and Drifting buoys observations

TABLES 1and 2 contain lists of the stations which are considered to have returned suspect observations of pressure, windspeed, wind direction or sea surface temperature, as appropriate, during the month. The criteria for quality control are given on the header page for each table.

Figures 1 and 2 show 10 degree lat/long box average numbers of SHIP/SYNOP and DRIFTER observations received per day throughout the month at Exeter and assimilated into model runs. All data are included. Box average values are plotted as the nearest whole number (values of x.5 are rounded up). Where the average is more than 999, then 999 is plotted. A box with no observations is blank. If the 24 hour average >0 but <0.5, then 0 is plotted.

Synop Observations

Table 3 contains a list of stations which are considered to have returned suspect observations of Pressure during the month. The criteria for quality control are given in the header page. The reporting practice of each station is included in the list of statistics.

At the UK Met. Office, we monitor SYNOP pressure after it has been interpolated to our Global NWP Model's surface height. For most synoptic stations (about 75%), the surface pressure (at the model surface) is calculated from the reported station-level pressure, or, if this is not available, the height of a standard pressure-level (e.g. 850 hPa or 700 hPa). If neither of these are available, or if the reported station-level pressure is deemed unreliable, the reported mean sea-level pressure is used (about 25% of SYNOPs).

Aircraft observations

Tables 4A (300-150 hPa) and 4B (1000-301 hPa) contain lists of statistics calculated from data received from all airline carriers.

Figures 3A (300-150 hPa) and 3B (1000-301 hPa) show 10 degree lat/long box average numbers of aircraft reports in AIREP/AMDAR code (including AIREP, ACAR, AMDAR, ASDAR and ADS) received per day throughout the month at Exeter and assimilated into model runs. Observations with a vector wind difference (compared with the model background field) of >60 m s^{-1} have been excluded. Box average values are plotted as the nearest whole number (values of x.5 are rounded up). Where the average is more than 999, then 999 is plotted. A box with no observations is blank. If the 24 hour average >0 but <0.5, then 0 is plotted.

Figures 4A-7A (300-150 hPa) and 4B-7B (1000-301 hPa) show wind statistics for AIREP/ASDAR in AIREP/AMDAR code (including AIREP, ACAR, AMDAR, ASDAR and ADS). Observations with a vector wind difference > 60 m s^{-1} have been excluded. Statistics have not been calculated for 10 degree lat/long boxes containing <31 observations.

Figure	Parameter
4	Mean wind vectors
5	Mean observation - background wind vector
6	Mean observation-background speed (m s^{-1})
7	RMS observation-background vector (m s^{-1})

Radiosonde Observations

TABLES 5-7 contain lists of the stations which are considered to have returned suspect observations of geopotential height, vector wind or wind direction, as appropriate, during the month. The criteria for quality control are given on the header page for each table.

Figures 8 and 9 show 10 degree lat/long box average numbers of TEMP 500 hPa GEOPOTENTIAL HEIGHT and TEMP/PILOT 300 hPa WIND observations received per day throughout the month at Exeter and assimilated into model runs. Data from all hours are included. Box average values are plotted as the nearest whole number (values of x.5 are rounded up). Where the average is more than 999, then 999 is plotted. A box with no observations is blank. If the 24 hour average >0 but <0.5, then 0 is plotted.

APPENDIX I shows details of the gross error limits used in TABLES 5 and 6 and the weights used in the RMS values in TABLE 5.

Satellite Observations

Figures 10-24 show satellite wind statistics for all geostationary satellites. All plots other than **AVAILABILITY** show average data where there are > 10 observations in a 10 degree lat/long box.

Figure	Parameter Plotted	Layer (hPa)
10	Availability/average daily number	701-1000
11	Vector mean wind (observed)	701-1000
12	Observation-background vector wind difference	701-1000
13	Mean observation-background speed differences	701-1000
14	RMS observation-background vector difference	701-1000
15	Availability/average daily number	401-700
16	Vector mean wind (observed)	401-700
17	Observation-background vector wind difference	401-700
18	Mean observation-background speed differences	401-700
19	RMS observation-background vector difference	401-700
20	Availability/average daily number	101-400
21	Vector mean wind (observed)	101-400
22	Observation-background vector wind difference	101-400
23	Mean observation-background speed differences	101-400
24	RMS observation-background vector difference	101-400

Figures 25-39 show sounding statistics from the polar orbitting satellite NOAA-15. Figure 25 shows the mean daily number of ATOVS soundings, and figures 26-39 show mean and standard deviation observation-background differences for brightness temperature, for selected channels.

Figure		Weighting function peak (hPa)
26	Mean	Surface (HIRS8)
27	SD	Surface (HIRS8)
28	Mean	700 (HIRS15)
29	SD	700 (HIRS15)
30	Mean	500-700 (HIRS11)
31	SD	500-700 (HIRS11)
32	Mean	400 (HIRS4)
33	SD	400 (HIRS4)
34	Mean	700 (AMSUA5)
35	SD	700 (AMSUA5)
36	Mean	300 (AMSUA7)
37	SD	300 (AMSUA7)
38	Mean	100 (AMSUA9)
39	RMS	100 (AMSUA9)

Figures 40-54 show sounding statistics from the polar orbitting satellite NOAA-16. Figure 40 shows the mean daily number of ATOVS soundings, and figures 41-54 show mean and standard deviation observation-background differences for brightness temperature, for selected channels.

Figure		Weighting function peak (hPa)
41	Mean	Surface (HIRS8)
42	SD	Surface (HIRS8)
43	Mean	700 (HIRS15)
44	SD	700 (HIRS15)
45	Mean	500-700 (HIRS11)
46	SD	500-700 (HIRS11)
47	Mean	400 (HIRS4)
48	SD	400 (HIRS4)
49	Mean	700 (AMSUA5)
50	SD	700 (AMSUA5)
51	Mean	300 (AMSUA7)
52	SD	300 (AMSUA7)
53	Mean	100 (AMSUA9)
54	RMS	100 (AMSUA9)

Figures 55-69 show sounding statistics from the polar orbitting satellite NOAA-17. Figure 55 shows the mean daily number of ATOVS soundings, and figures 56-69 show mean and standard deviation observation-background differences for brightness temperature for selected channels.

Figure		Weighting function peak (hPa)
56	Mean	Surface (HIRS8)
57	SD	Surface (HIRS8)
58	Mean	700 (HIRS15)
59	SD	700 (HIRS15)
60	Mean	500-700 (HIRS11)
61	SD	500-700 (HIRS11)
62	Mean	400 (HIRS4)
63	SD	400 (HIRS4)
64	Mean	700 (AMSUA5)
65	SD	700 (AMSUA5)
66	Mean	300 (AMSUA7)
67	SD	300 (AMSUA7)
68	Mean	100 (AMSUA9)
69	RMS	100 (AMSUA9)

N.B. All satellite sounding data is bias-corrected (and thinned) before being assimilated in the UKMO NWP model.

3 Composite Observing Systems for the North Atlantic (COSNA)

This section shows statistics for upper air (radiosonde and aircraft) and surface (drifter) data for the North Atlantic area for data received at Exeter during the month.

TABLE 8 shows quality statistics for **Mean Sea-level Pressure, Windspeed and Wind Direction** received at Exeter in DRIFTER code during the month for the area 10°N - 80°N, 85°W - 0°W.

TABLE 9 shows quality statistics for **Temperature and Vector Wind** received at Exeter from aircraft during the month for the area 40°N - 70°N, 60°W - 0°W.

Table 10 - 13 show quality statistics (**Geopotential Height and Windspeed at 100 and 500 hPa**) for all TEMPSHIPS in the area bounded by 0°N - 90°N, 100°W - 40°E and selected TEMP stations within the same area.

Revisions

1. May 95 Monitoring statistics for NOAA-11 removed. Figures 25-27 now show data for NOAA-12
2. May 95 Notes giving details of observations included in wind direction statistics clarified and corrected.
3. August 95 Monitoring statistics for NOAA-14 added with figures 28-30.
4. February 96 Monitoring statistics for GOES-7 have been replaced by statistics for GOES-8 and GOES-9.
5. April 96. 500 km and 120 km SATEMs replaced by 120 km resolution temperature profiles produced locally from the radiances disseminated by NESDIS.
6. February 97 Monitoring statistics for Meteosat 5 have been replaced by statistics for Meteosat 6.
7. Sept 97 Monitoring statistics for NOAA-12 removed. Figures 25-27 now show data for NOAA-11
8. January 1998. Increase in resolution of UKMO global forecast model.
9. April 1998. GOES winds ceased on 2nd March 1998, and were replaced with GOES high resolution winds from 15th.
10. June 1998. Monitoring statistics for Meteosat-6 were replaced by monitoring statistics for Meteosat-7, from 3rd June.
11. June 1998. Corrections in our processing of radiosonde data resulted in a decrease in the number of 500hPa geopotential heights in Figure 8 of about 230 per 24 hours (compared with previous reports), and a small increase in the number of 300hPa winds in Figure 9.
12. July 1998. Meteosat-5 began transmitting winds from 2nd July, at 63 degrees East (over the Indian ocean), and this data is included in the statistics.
13. July 1998. GOES-9 (at 135W) was replaced mid-month by GOES-10 (initially at 105W, moving towards 135W).
14. February 1999. Problems with NOAA-11, and TOVS data ceased to be assimilated from 26 February.
15. March 1999. UKMO introduced 3-D VAR assimilation system on 29 March, and also began assimilating ATOVS data from NOAA-15.
16. May 1999. Included statistics for ATOVS sounding data from NOAA-15.
17. September 1999. Included statistics for high resolution visible winds from Meteosat-5 and Meteosat-7.
18. October 1999. The 3-D VAR assimilation system was upgraded on 19 October, including improvements in the assimilation of ATOVS radiances, use of SSM/I surface wind speed, an improvement in the calculation of surface pressure for SYNOPs, and thinning and revision of observation errors of aircraft data.
19. November 1999. High resolution visible winds from Meteosat-5 and Meteosat-7 removed until used operationally.
20. April 2000. Aireps in Table 4 and Figures 3-7 split into ranges 300-150 hPa (A) and 1000-301 hPa (B).
21. September 2000. Corrected an error affecting the mean positions of a minority of buoys in Table 2.
22. November 2000. An error in the production of Table 6 was corrected. Previously, some sondes with suspect vector winds were being missed.
23. April 2001. Included statistics for ATOVS sounding data from NOAA-16.
24. May 2001. Included statistics for sea surface temperatures from marine surface observations.
25. December 2002. Included statistics for ATOVS sounding data from NOAA-17.
26. December 2002. Meteosat-7 and Meteosat-5 SATOB winds replaced by higher resolution BUFR-coded winds.
27. November 2003. Included temperature and relative humidity statistics for ships, fixed buoys and platforms in Table 1.
28. November 2003. NOAA 17 statistics no longer available due to malfunction of the AMSU-A instrument.

TABLE 1

MONITORING OF MARINE SURFACE OBSERVATIONS
MONTHLY SUSPECT LIST - SHIPS, FIXED BUOYS AND PLATFORMS
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from each unique identifier for ships, fixed buoys and platforms.

Standard of comparison :Background field from UKMO global model.

Observation times :All hours

Elements monitored
:Mean sea level pressure (hPa).
:Wind speed ($m\ s^{-1}$).
:Wind direction (Degrees).
:Air temperature (Degrees C).
:Relative Humidity (%).
:Sea surface temperature (Degrees).

Parameters monitored

:NOBS :Number of observations received excluding duplicates.

:PGE :Percentage of observations with gross errors.

:%REJ :Percentage of observations flagged excluding those with gross errors.

:SD :SD of difference of observations from background values excluding those with gross errors.

:BIAS :Mean difference of observations from background values excluding those with gross errors.
N.B. a positive bias indicates the wind observation is veered to the background.

:RMS :Root Mean Square difference of observations from background values excluding those with gross errors.

GROSS ERROR LIMIT
:15 hPa (pressure)
:25 $m\ s^{-1}$ (vector wind)
:15 degrees (air temperature)
:10 degrees (sea surface temperature)

SELECTION CRITERIA :NOBS ≥ 20 , and one or more of the following:

1.|bias|	≥ 4 hPa	(pressure),
	≥ 5 $m\ s^{-1}$	(wind speed),
	≥ 30 degrees	(direction).
	≥ 3 degrees	(sea surface temperature).
	≥ 4 degrees	(air temperature)
	≥ 15%	(relative humidity)
2.SD	≥ 6 hPa	(pressure),
	≥ 80 degrees	(direction).
	≥ 5 degrees	(sea surface temperature).
	≥ 6 degrees	(air temperature)
	≥ 25%	(relative humidity)
3.PGE	≥ 25	

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 $m\ s^{-1}$

IDENTIFIER	ELEM	NOBS	PGE	%REJ	SD	BIAS	RMS
A8AS7	P	29	0	34	1.2	4.2	4.4
DGHX	P	25	0	88	1.6	4.2	4.5
DQVI	P	62	0	61	1.1	4.5	4.6
ELSR6	P	23	0	100	1.4	-6.0	6.1
JHHU	P	30	0	83	1.2	-5.0	5.1
MANE	P	48	0	75	0.7	5.8	5.8
TEST	P	117	98	100	0.2	-9.5	9.5
UDKC	P	40	2	52	2.6	4.5	5.2
UDUR	P	27	7	74	4.4	8.5	9.6
UIZE	P	61	7	90	1.9	5.9	6.2
VOTV	P	30	60	100	3.7	-7.3	8.2
VTXK	P	28	0	57	1.9	4.4	4.8
V2AF4	P	44	0	0	0.9	4.3	4.4
V2OB1	P	40	27	100	5.6	-5.3	7.7
V7DY3	P	35	6	94	7.4	-8.6	11.3
WCY7054	P	30	10	47	1.3	5.3	5.4
WDJK	P	35	3	11	1.3	-4.4	4.6
3FPS9	P	37	0	5	2.0	-4.3	4.7
62166	P	68	1	100	4.8	4.3	6.4
63108	P	30	0	100	3.4	6.1	7.0

IDENTIFIER	ELEM	NOBS	PGE	%REJ	SD	BIAS	RMS
C6NR5	SPEED	56	4	46	5.9	10.4	12.0
DGZO	SPEED	56	0	73	5.3	6.2	8.1
ELGJ9	SPEED	43	0	0	2.4	5.1	5.6
ELTY4	SPEED	30	0	100	5.3	10.1	11.4
ELZX2	SPEED	48	2	13	4.7	6.1	7.7
HP6038	SPEED	236	0	50	3.4	5.1	6.2
H9RS	SPEED	58	0	7	2.4	5.3	5.8
MSQQ8	SPEED	23	0	26	4.4	5.3	6.9
MYJG2	SPEED	34	9	38	5.3	7.8	9.4
MZPQ3	SPEED	47	2	100	5.3	9.1	10.6
OWLD2	SPEED	20	0	5	4.4	5.7	7.2
P3GU9	SPEED	28	0	0	4.1	5.0	6.5
SCKM	SPEED	38	0	100	2.7	5.2	5.8
SWYM	SPEED	20	5	95	4.9	5.1	7.0
TSMU	SPEED	45	7	31	6.5	6.9	9.5
V2EA4	SPEED	43	21	100	5.9	7.5	9.6
ZCBH9	SPEED	40	0	27	4.7	5.6	7.3
ZCBO6	SPEED	35	0	14	1.7	5.8	6.0
3FEI6	SPEED	87	2	100	3.2	6.7	7.4

IDENTIFIER	ELEM	NOBS	PGE	%REJ	SD	BIAS	RMS
A8DU3	DIRN.	26	19	0	91.2	49.0	103.5
ELXD4	DIRN.	24	0	0	43.8	32.1	54.3
OYYK2	DIRN.	29	0	0	32.4	-31.0	44.8
SP32	DIRN.	45	0	0	27.9	53.9	60.7
UDKC	DIRN.	32	3	0	69.5	32.0	76.5
WCY7052	DIRN.	33	3	0	29.8	-36.5	47.1
23168	DIRN.	47	2	0	13.8	84.7	85.8
3ETX6	DIRN.	59	0	0	32.5	49.1	58.9

IDENTIFIER	ELEM	NOBS	PGE	%REJ	SD	BIAS	RMS
CGDT	T	579	0	100	4.0	-6.9	7.9
KS034	T	64	11	100	0.8	13.3	13.3
SP32	T	122	9	100	3.5	-9.5	10.2
TEST	T	117	24	100	6.9	2.9	7.5
UCJS	T	31	0	100	2.1	-5.1	5.5
WAQ2746	T	31	0	100	2.9	4.9	5.7
WCW9126	T	69	3	100	3.7	4.4	5.8
WI9491	T	24	8	100	3.5	4.9	6.0
WWU8	T	26	31	100	2.8	8.5	8.9

46081	T	733	3	100	3.4	6.0	6.9
46131	T	723	0	100	1.9	5.5	5.9
46146	T	728	0	100	1.8	5.2	5.5
46181	T	724	0	100	2.7	4.5	5.2
7KXF	T	32	41	100	2.4	-1.8	3.0

IDENTIFIER	ELEM	NOBS	PGE	%REJ	SD	BIAS	RMS
A8BZ6	RH	24	0	100	9.5	21.0	23.1
FHZI	RH	86	0	100	5.6	-17.0	17.9
FNAT	RH	63	0	100	7.4	22.5	23.7
GURN	RH	53	0	100	8.4	23.5	25.0
JDAI	RH	69	0	100	5.3	20.1	20.7
ONAT	RH	20	0	100	26.5	14.2	30.1
PDBP	RH	25	0	100	12.9	-19.9	23.7
SCKM	RH	30	0	100	28.5	-20.3	35.0
V2AW5	RH	21	0	100	7.4	17.2	18.7
V2RA	RH	40	0	100	10.0	20.3	22.6
V7DQ8	RH	64	0	100	11.1	15.4	19.0
XXUU	RH	57	0	100	6.1	17.9	18.9
ZSWAV1	RH	52	0	100	9.0	-29.1	30.4
4XFY	RH	23	0	100	8.7	17.6	19.6
9MCM4	RH	24	0	100	10.4	15.7	18.8

IDENTIFIER	ELEM	NOBS	PGE	%REJ	SD	BIAS	RMS
C6SI4	SST	23	0	61	2.5	-3.7	4.5
C6YW	SST	23	0	30	1.3	-3.2	3.5
ELWY3	SST	24	0	104	0.5	3.3	3.4
ELXE2	SST	23	43	78	1.5	1.1	1.9
ELZT3	SST	488	90	103	0.4	0.2	0.5
ELZV9	SST	58	2	100	2.1	-4.3	4.8
FNJI	SST	110	0	100	0.5	3.1	3.1
GURN	SST	51	25	25	0.6	1.4	1.5
KGJX	SST	56	0	82	1.1	3.1	3.3
KRPB	SST	52	0	100	0.9	-3.5	3.6
KS011	SST	237	0	81	2.1	-3.1	3.8
LAJV4	SST	60	0	100	1.6	3.2	3.6
LAVY4	SST	23	0	26	1.0	-3.1	3.3
PFAR	SST	28	0	68	3.4	4.6	5.7
PHPO	SST	59	0	100	0.5	-3.4	3.4
PHSG	SST	34	0	100	0.8	-4.7	4.7
P3KT8	SST	25	0	72	2.1	3.3	3.9
P3SL7	SST	22	5	45	2.2	3.0	3.7
SHJC	SST	51	0	90	1.7	4.2	4.5
SLCH	SST	31	0	100	1.1	3.8	3.9
S6IW	SST	42	26	38	1.5	3.6	3.9
S6TS	SST	57	2	100	3.1	-4.8	5.8
TSLN	SST	56	0	100	1.4	-3.6	3.9
UCAB	SST	21	0	81	2.0	-5.0	5.4
UCBM	SST	75	0	43	2.8	-3.1	4.2
UCOL	SST	37	0	100	1.3	-3.0	3.3
UHRT	SST	53	0	102	0.4	-3.8	3.8
V2KA8	SST	33	0	30	2.6	3.5	4.3
V2OH1	SST	40	0	63	2.1	-4.6	5.0
V2WB	SST	27	4	56	2.4	-3.5	4.2
V7DN3	SST	47	0	79	1.0	-4.1	4.2
WAAH	SST	70	0	100	2.0	3.1	3.7
ZCBQ2	SST	28	4	100	1.8	6.3	6.6
ZMFR	SST	147	80	100	0.4	-9.3	9.3
3FKM8	SST	26	0	100	1.7	-4.0	4.3
3FRR5	SST	63	0	100	1.7	4.0	4.3
31056	SST	312	93	100	4.9	3.9	6.3
42007	SST	740	0	54	0.8	-3.1	3.2
7KXF	SST	33	42	42	1.0	0.0	1.0
9VNA	SST	21	0	29	0.7	3.7	3.7

Figure 1. SHIP/SYNOP mean daily count. DECEMBER 2003
All hours
Global average number of observations in 24 hours = 20743

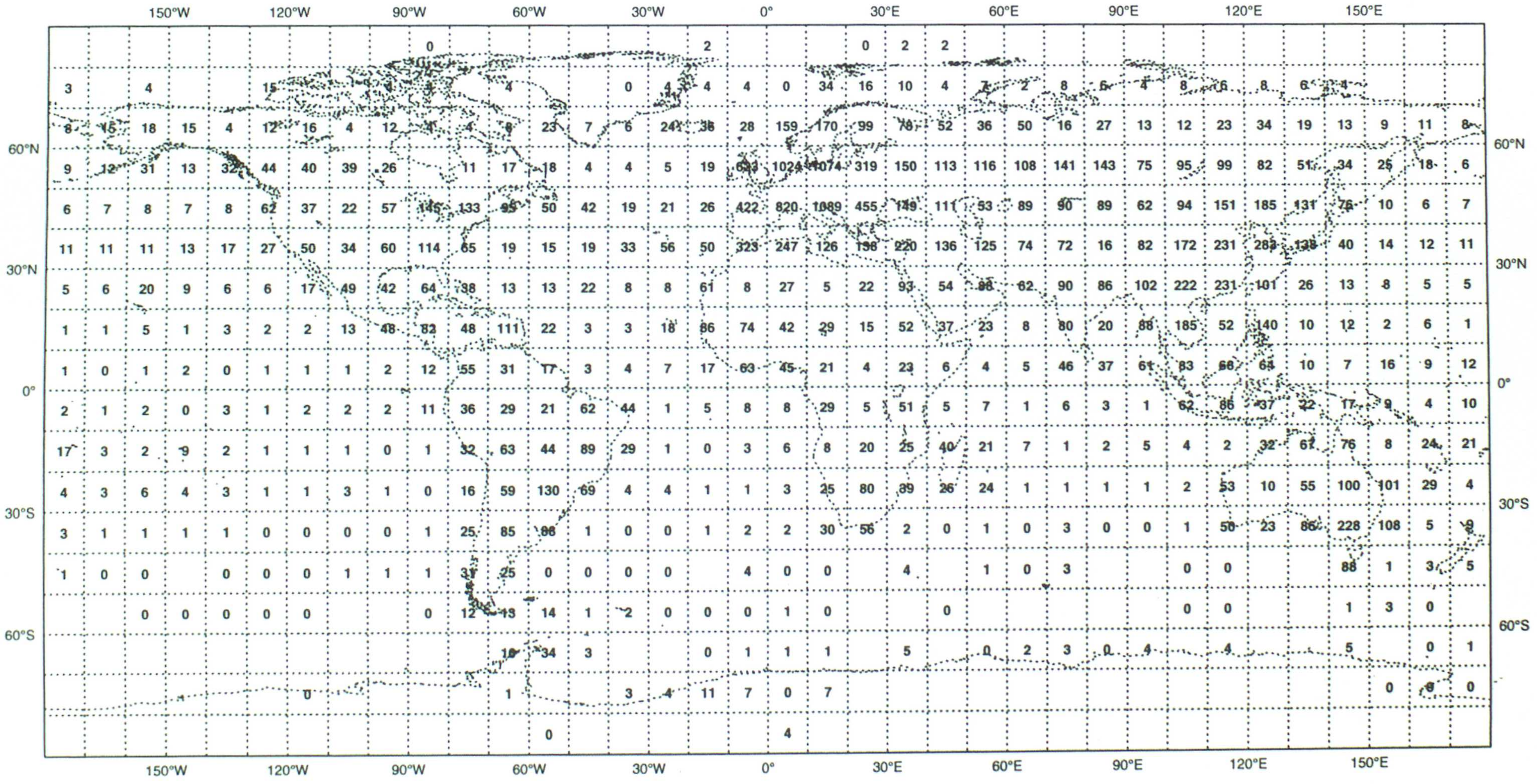

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

TABLE 2

MONITORING OF MARINE SURFACE OBSERVATIONS
MONTHLY SUSPECT LIST - DRIFTING BUOYS
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures			
Period		:One calendar month.	
Data monitored		:Reports from each unique identifier for drifting buoys.	
Standard of comparison		:Background field from UKMO global model.	
Position		:Average latitude and longitude for period.	
Observation times		: All hours	
Elements monitored		:Mean sea level pressure (hPa). :Wind speed (m s^{-1}). :Wind direction (degrees). :Sea surface temperature (degrees).	
Parameters monitored	:NOBS	:Number of observations received excluding duplicates.	
	:PGE	:Percentage of observations with gross errors.	
	:%REJ	: Percentage of observations flagged excluding those with gross errors	
	:SD	:SD of difference of observations from background values excluding those with gross errors.	
	:BIAS	:Mean difference of observations from background values excluding those with gross errors. **N.B. a positive bias indicates the wind observation is veered to the background.**	
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors.	
GROSS ERROR LIMIT	:15 hPa	(pressure)	
	:25 m s^{-1}	(vector wind)	
	:10 degrees	(sea surface temperature)	
SELECTION CRITERIA :	NOBS	≥ 20 , and one or more of the following:	
	1.|bias|	≥ 4 hPa	(pressure),
		≥ 5 m s^{-1}	(wind speed),
		≥ 30 degrees	(direction).
		≥ 3 degrees	(sea surface temperature).
	2.SD	≥ 6 hPa	(pressure),
		≥ 80 degrees	(direction).
		≥ 5 degrees	(sea surface temperature).
	3.PGE	≥ 25.	

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 m s^{-1}

```
IDENTIFIER   LAT.   LONG.   ELEM    NOBS   PGE  %REJ    SD   BIAS    RMS

61524        35.0    34.0     P       36     0   100   0.7   -8.8    8.8
71543       -71.0   -11.3     P      224    39    88   0.8    1.0    1.3

IDENTIFIER   LAT.   LONG.   ELEM    NOBS   PGE  %REJ    SD   BIAS    RMS

52525        17.6   149.0   SPEED     67     0   100   1.0   -6.5    6.5

IDENTIFIER   LAT.   LONG.   ELEM    NOBS   PGE  %REJ    SD   BIAS    RMS

41595        27.8   -42.6   DIRN.    397     0     0  21.5  -31.1   37.8
46702        37.9  -148.7   DIRN.     80    13     0 106.7  -91.0  140.2

IDENTIFIER   LAT.   LONG.   ELEM    NOBS   PGE  %REJ    SD   BIAS    RMS

16577       -45.6    75.0    SST     270     0    79   0.8    3.3    3.4
22571        34.6   138.2    SST     126    25    79   2.8   -5.4    6.1
22917        20.0   117.9    SST      37    32    84   4.1    4.3    5.9
32693         1.2  -109.2    SST     533     0   100   0.5    3.6    3.6
33502       -31.0   -19.2    SST     118     0   100   0.4    4.2    4.3

46551        53.5  -167.8    SST     394     0    74   1.7   -3.6    3.9
46972        18.5  -168.1    SST     177     0   100   0.2    4.5    4.5
56530       -15.5    97.3    SST      78    17    91   1.3    4.2    4.4
61524        35.0    34.0    SST      36     0    92   2.3   -5.0    5.5
64523        67.1   -21.7    SST     764     0   100   0.8    4.7    4.8

64607        61.5   -30.6    SST     216    39    41   1.1    0.8    1.4
```

Figure 2. DRIFTER mean daily count. DECEMBER 2003
All hours
Global average number of observations in 24 hours = 11241

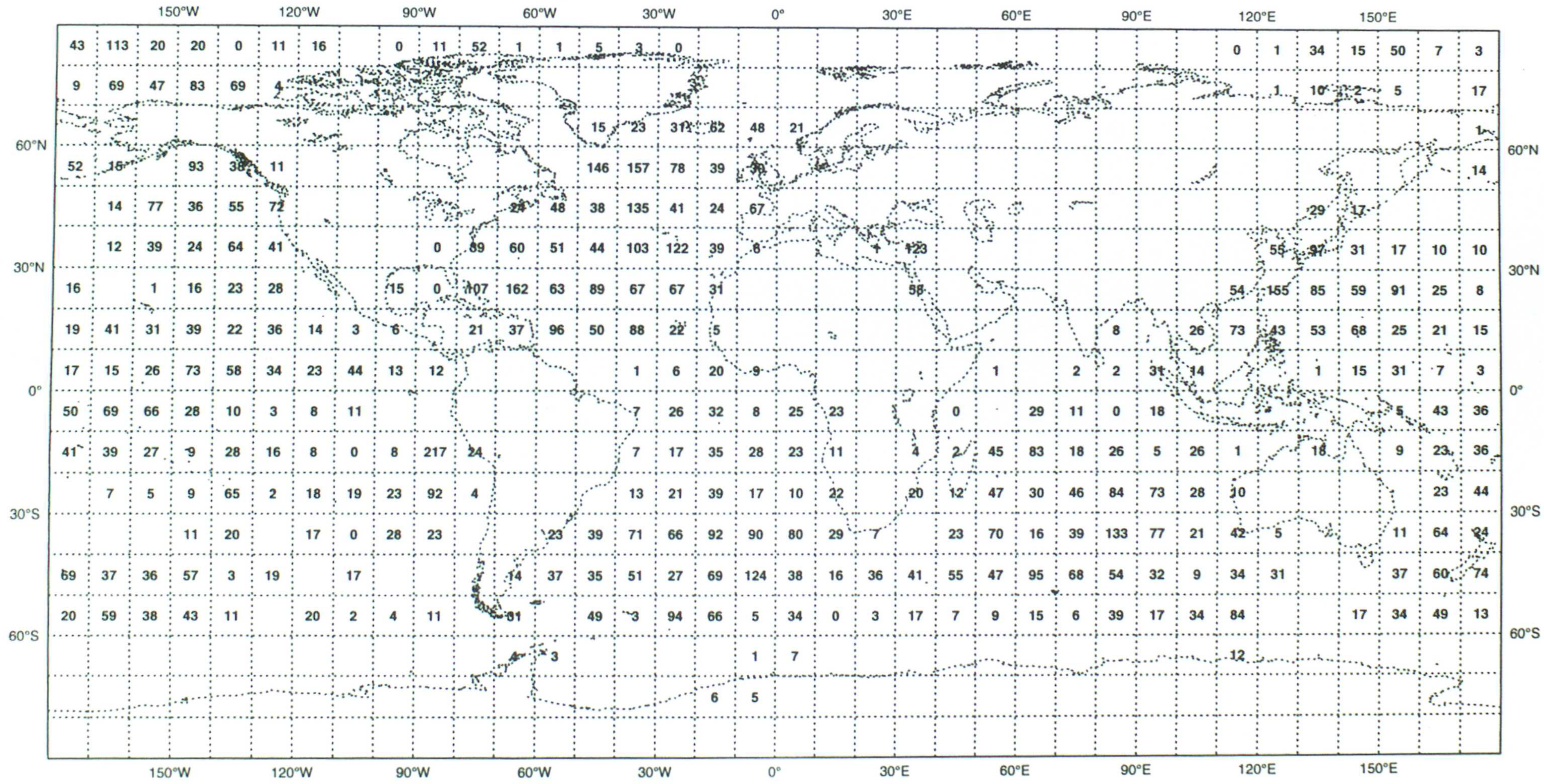

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
43 113 20 20 0 11 16 0 11 52 1 1 5 3 0 0 1 34 15 50 7 3
9 69 47 83 69 4 1 10 2 5 17
15 23 31 62 48 21 1
52 16 93 38 11 146 157 78 39 30 14
14 77 36 55 72 24 48 38 135 41 24 67 29 17
12 39 24 64 41 0 89 60 51 44 103 122 39 6 123 55 97 31 17 10 10
16 1 16 23 28 15 0 107 162 63 89 67 67 31 58 54 155 85 59 91 25 8
19 41 31 39 22 36 14 3 6 21 37 96 50 88 22 5 8 26 73 43 53 68 25 21 15
17 15 26 73 58 34 23 44 13 12 1 6 20 9 1 2 2 31 14 1 15 31 7 3
50 69 66 28 10 3 8 11 7 26 32 8 25 23 0 29 11 0 18 5 43 36
41 39 27 9 28 16 8 0 8 217 24 7 17 35 28 23 11 4 2 45 83 18 26 5 26 1 18 9 23 36
7 5 9 65 2 18 19 23 92 4 13 21 39 17 10 22 20 12 47 30 46 84 73 28 10 23 44
11 20 17 0 28 23 23 39 71 66 92 90 80 29 7 23 70 16 39 133 77 21 42 5 11 64 24
69 37 36 57 3 19 17 14 37 35 51 27 69 124 38 16 36 41 55 47 95 68 54 32 9 34 31 37 60 74
20 59 38 43 11 20 2 4 11 31 49 3 94 66 5 34 0 3 17 7 9 15 6 39 17 34 84 17 34 49 13
3 1 7 12
6 5

TABLE 3

MONITORING OF LAND SURFACE OBSERVATIONS
MONTHLY SUSPECT LIST - SYNOPS & AUTOSYNOPS
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from each unique identifier for synops & autosynops.
Standard of comparison		:Background field from UKMO global model.
Observation times		:00, 06, 12, 18 UTC
Elements monitored		:Surface pressure (hPa).
Parameters monitored	:HT(m)	:Station height (in metres) as given in WMO No. 9 Vol A
	:RP	:Pressure reporting practice M=mean sea level pressure (hPa) reported. S=Station level pressure reported. 8=Geopotential height (m) of 850 hPa surface reported. 7=Geopotential height (m) of 700 hPa surface reported.
	:NOBS	:Number of observations received excluding duplicates.
	:NGE	:Number of observations with gross errors.
	:PGE	:Percentage of observations with gross errors.
	:%REJ	:Percentage of observations flagged excluding those with gross errors.
	:SD	:SD of difference of observations from background values excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors.
GROSS ERROR LIMIT	:15 hPa	(pressure)
SELECTION CRITERIA	:NOBS	≥ 20 ,and one or more of the following:
	1.|bias|	≥ 4 hPa
	2. SD	≥ 6 hPa
	3.PGE	≥ 25.

N.B. For stn ht ≥ 500m, mslp is that calculated from station level pressure where available.
For stn ht < 500m, mslp is that as reported by the station where available.

SUSPECT SYNOPS (PRESSURE) BY WMO REGION DEC 200

WMO REGION 1:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
60320	35.9N	5.3W	2	MS	63	3	5	0	1.2	-9.7	9.8
60728	36.4N	10.7E	1	MS	89	0	0	0	0.8	-8.7	8.7
61492	16.1N	13.5W	18	MS	71	0	0	1	1.3	4.0	4.2
62056	32.8N	21.8E	625	S	58	2	3	2	1.3	-5.0	5.2
62271	24.2N	23.3E	417	M	51	0	0	0	0.7	4.0	4.1
63801	4.9S	29.6E	882	S8	50	4	8	6	0.9	8.3	8.3
63881	8.0S	31.6E	1923	S	45	7	16	7	0.8	12.7	12.7
65355	9.8N	1.1E	342	MS	112	0	0	1	1.1	-13.2	13.2
68030	18.5S	25.6E	1071	8	75	0	0	0	3.3	5.3	6.2
68300	26.6S	15.1E	16	M	73	27	37	37	6.2	-10.3	12.0
68372	26.9S	29.2E	1563	S8	94	0	0	46	1.2	4.4	4.6
68396	26.5S	31.3E	641	S8	53	0	0	2	1.2	4.6	4.8
68575	30.0S	30.0E	1175	S8	114	114	100	0			
68674	31.6S	29.6E	47	MS	25	2	8	96	1.5	7.8	7.9

WMO REGION 2:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
24671	63.9N	135.9E	402	MS	94	0	0	7	2.1	4.0	4.5
25248	67.3N	168.0E	353	MS	20	0	0	40	2.6	8.0	8.4
30554	54.5N	113.6E	995	MS	123	1	1	0	3.5	7.6	8.4
35358	49.6N	63.5E	123	MS	111	0	0	12	1.6	-4.0	4.3
35416	49.1N	54.7E	128	S	123	0	0	0	0.6	4.1	4.1
36982	41.9N	78.2E	3635	7	119	2	2	1	1.1	6.1	6.2
38565	40.6N	65.7E	485	MS	118	118	100	0			
38846	38.4N	70.0E	1437	8	33	0	0	58	1.6	-5.0	5.2
40435	24.5N	44.4E	991	MS	60	0	0	0	0.9	7.8	7.9
40700	39.6N	47.9E	45	MS	119	1	1	0	1.0	-6.2	6.3
40713	37.4N	46.3E	1475	MS	114	15	13	0	0.9	13.5	13.5
40726	36.8N	45.7E	1384	MS	117	2	2	3	1.9	4.2	4.6
40741	36.5N	61.2E	235	MS	117	0	0	0	1.0	-5.1	5.2
40757	35.6N	53.4E	1171	MS	122	0	0	2	1.5	5.8	6.0
40780	33.6N	46.4E	1362	MS	118	0	0	0	0.6	4.6	4.6
41254	23.1N	57.6E	1755	S8	100	100	100	0			
41314	17.7N	54.0E	467	MS	122	0	0	0	0.7	4.1	4.2
44212	50.0N	92.1E	940	MS	122	3	2	25	2.5	4.4	5.1
44265	46.1N	91.5E	1186	MS	121	0	0	2	1.6	5.8	6.0
44416	28.6N	81.6E	720	MS	69	3	4	3	2.7	4.2	5.0
47022	40.8N	128.2E	1224	S	99	0	0	2	1.1	4.5	4.6
47678	33.1N	139.8E	79	MS	123	0	0	0	0.9	-9.3	9.3
48381	16.4N	102.8E	165	MS	122	0	0	0	0.7	-4.0	4.1
48924	21.1N	101.5E	644	S	41	0	0	0	1.0	10.8	10.8
48925	20.7N	102.0E	550	S	54	0	0	0	0.9	-10.7	10.7
48938	19.2N	101.7E	326	MS	51	38	75	0	0.4	14.4	14.4
50727	47.2N	119.9E	1028	MS	123	0	0	0	0.8	5.2	5.3
51053	48.1N	86.4E	534	M	114	0	0	10	1.9	4.0	4.4
51288	45.4N	90.5E	1651	S	123	0	0	51	1.5	-5.5	5.7
51334	44.6N	82.9E	321	M	117	0	0	68	2.9	6.8	7.4
51379	44.0N	89.6E	794	M	112	0	0	77	2.6	7.9	8.3
51495	43.2N	91.7E	874	M	114	0	0	0	1.8	10.0	10.2
51818	37.6N	78.3E	1376	M	117	0	0	56	2.1	5.1	5.5
52378	41.4N	102.4E	960	M	117	0	0	21	1.9	5.1	5.4
52866	36.6N	101.8E	2262	S	123	0	0	0	1.1	-4.1	4.2
53083	44.6N	114.2E	1183	M	114	0	0	40	2.9	7.5	8.0
53352	41.7N	110.4E	1377	M	116	0	0	23	3.1	5.8	6.6
53480	41.0N	113.1E	1416	M	111	0	0	24	3.0	6.4	7.1
53487	40.1N	113.3E	1069	M	117	0	0	30	2.5	5.3	5.9
53502	39.8N	105.8E	1143	M	117	0	0	29	2.3	5.4	5.9

53593	39.8N	114.6E	910	M	116	0	0	58	2.7	5.8	6.4
53705	37.5N	105.7E	1185	M	116	0	0	40	2.2	5.0	5.5
53764	37.5N	111.1E	951	M	114	0	0	1	2.4	4.4	5.0
53787	37.1N	113.0E	1042	M	114	0	0	2	2.0	4.0	4.5
54115	43.6N	118.1E	800	M	117	0	0	14	2.0	4.1	4.6
54308	41.2N	116.6E	661	M	112	0	0	0	2.0	4.3	4.7
54311	41.9N	117.8E	844	M	117	0	0	3	2.2	4.2	4.7
54386	41.4N	128.2E	1018	M	117	1	1	71	3.0	6.6	7.2
56193	32.4N	104.5E	877	M	121	0	0	7	2.7	5.9	6.5
56287	30.0N	103.0E	629	M	121	0	0	8	1.9	5.6	5.9
56385	29.5N	103.3E	3049	S	121	0	0	32	2.4	-5.6	6.1
56462	29.0N	101.5E	2994	S	123	0	0	0	1.5	8.7	8.8
56768	25.0N	101.5E	1773	S	120	0	0	0	0.8	-5.4	5.5
57006	34.6N	105.8E	1143	M	111	0	0	0	1.9	5.0	5.3
57016	34.3N	107.1E	610	M	111	0	0	8	1.6	4.5	4.8
57816	26.6N	106.7E	1074	MS	123	118	96	0	0.4	-14.3	14.3
58437	30.1N	118.2E	1836	S	120	0	0	44	1.6	-4.1	4.4

WMO REGION 3:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
80434	9.2N	66.0W	125	MS	99	1	1	33	1.2	-5.2	5.3
82181	2.0S	54.1W	146	MS	81	0	0	0	1.3	6.1	6.2
82704	7.6S	72.7W	170	MS	71	0	0	1	1.7	-4.7	5.0
82765	7.3S	47.5W	193	MS	81	1	1	0	0.8	4.0	4.1
83235	12.4S	46.4W	604	MS	87	0	0	0	0.8	6.6	6.6
83332	14.1S	46.4W	826	MS	85	8	9	1	0.9	13.3	13.3
83470	17.9S	50.9W	727	MS	87	0	0	0	0.7	-5.5	5.5
83531	18.6S	46.5W	940	MS	85	0	0	0	0.7	-6.1	6.1
83738	22.5S	44.5W	440	MS	82	13	16	46	0.7	-13.8	13.8
83836	25.5S	50.6W	837	MS	87	0	0	0	0.9	-5.3	5.4
84425	5.9S	76.1W	179	MS	26	0	0	0	1.2	5.0	5.1
84455	6.5S	76.4W	281	M	90	0	0	0	1.4	7.5	7.6
84472	7.1S	78.5W	2620	S	61	0	0	0	0.8	-5.1	5.2
84474	7.2S	76.7W	350	S	26	0	0	0	1.3	9.9	10.0
84686	13.6S	72.0W	3248	S	120	0	0	0	0.8	-4.6	4.7
84688	13.7S	73.4W	3444	S	51	0	0	0	0.5	-12.2	12.2
84720	14.9S	75.0W	567	MS	60	0	0	0	0.7	4.6	4.7
84782	18.1S	70.3W	468	MS	98	0	0	0	1.0	8.0	8.1
85140	14.3S	67.4W	140	MS	60	0	0	0	1.1	6.9	7.0
85264	18.5S	64.1W	1998	S	59	1	2	0	0.9	-4.3	4.4
85312	19.8S	63.9W	992	S	46	1	2	11	1.9	-11.1	11.3
85406	18.3S	70.3W	55	M	119	0	0	0	0.8	4.5	4.6
85432	22.5S	68.9W	2320	S8	79	0	0	0	0.5	5.0	5.0

WMO REGION 4:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
71048	61.6N	125.8W	610	MS	58	0	0	17	1.8	8.2	8.4
71049	66.0N	91.8W	150	MS	122	118	97	0	0.6	14.1	14.1
71181	47.1N	55.3W	29	MS	114	0	0	0	0.9	-6.0	6.1
71408	47.4N	55.8W	35	MS	121	0	0	0	1.1	-5.5	5.6
71475	49.3N	124.8W	2	MS	121	0	0	0	1.2	-7.7	7.8
71506	67.0N	136.2W	720	MS	122	1	1	20	2.4	-6.5	6.9
71599	44.4N	65.2W	127	MS	121	0	0	0	0.7	-4.5	4.6
71747	48.8N	91.6W	424	MS	119	0	0	0	0.6	4.1	4.1
72327	36.1N	86.7W	182	MS	122	0	0	0	0.6	4.0	4.0
76055	31.0N	114.9W	440	MS	63	63	100	0			
76225	28.6N	106.1W	1435	MS	66	2	3	5	2.1	-4.0	4.5
76543	22.0N	98.8W	104	MS	36	0	0	0	1.5	7.1	7.3
76658	19.2N	103.7W	494	MS	27	0	0	0	0.5	5.4	5.4
76762	17.5N	99.5W	1265	MS	65	0	0	0	0.9	5.1	5.2
76903	14.9N	92.3W	118	MS	65	0	0	0	0.9	5.5	5.6

78588	17.2N	87.5W	-307	M	123	116	94	0	0.9	-0.2	0.9

WMO REGION 5:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
94130	14.8S	131.9E	120	MS	123	0	0	3	1.3	5.3	5.5
96505	3.7N	115.7E	35	M	43	42	98	0	0.0	-1.5	1.5
97378	10.7S	123.1E	1	MS	34	31	91	0	3.4	-11.8	12.3
98851	6.1N	125.2E	14	M	94	10	11	68	5.0	-7.0	8.6

WMO REGION 6:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
01360	61.9N	7.9E	711	MS	123	0	0	0	1.3	6.9	7.0
02151	66.5N	20.2E	275	M	59	21	36	42	4.9	0.9	5.0
06605	47.1N	7.1E	1599	S8	122	0	0	5	1.2	-5.1	5.2
06685	47.0N	9.1E	515	MS	122	0	0	12	1.9	7.3	7.5
10850	48.8N	10.7E	457	MS	368	0	0	0	0.6	-5.8	5.8
11116	47.5N	10.8E	870	MS	60	1	2	0	1.0	4.7	4.8
12510	50.7N	15.7E	1603	S8	122	0	0	40	2.0	-4.2	4.7
13269	44.3N	19.9E	176	MS	121	0	0	0	1.0	8.3	8.4
13289	44.1N	21.9E	1037	8	120	0	0	70	2.1	-4.1	4.6
14554	44.9N	18.4E	136	S	44	2	5	0	1.2	-13.1	13.2
17203	38.9N	40.5E	1177	S8	122	0	0	1	1.3	6.2	6.3
17310	36.6N	32.0E	6	MS	99	77	78	0	0.9	-0.2	0.9
37018	44.1N	39.0E	95	MS	117	1	1	81	2.2	5.8	6.2

ANTARCTIC:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
89004	71.7S	2.8W	815	MS	89	0	0	0	1.2	-5.8	5.9
89253	63.2S	55.4W	75	M	44	0	0	0	0.8	5.4	5.5
89263	66.0S	66.1W	20	M	259	235	91	0	11.7	-2.5	12.0
89264	71.4S	68.9W	780	S	253	0	0	0	0.9	7.6	7.7
89266	72.2S	60.2W	91	S	82	82	100	45			
89272	75.0S	70.8W	1395	S	262	262	100	0			
89610	65.9S	113.1E	90	S	238	0	0	0	1.0	-8.4	8.5
89614	66.6S	111.2E	500	S	266	266	100	0			
89661	73.1S	169.6E	200	S	25	0	0	0	2.3	7.1	7.5
89666	76.7S	163.0E	200	S	21	21	100	0			
89744	74.0S	43.1E	3353	S	278	0	0	0	0.7	7.1	7.1
89811	66.7S	112.8E	1366	S	257	0	0	0	0.9	-4.0	4.1

TABLE 4A

MONTHLY MONITORING OF AIRCRAFT OBSERVATIONS
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures

Period :One calendar month.

Data monitored :Statistics for each airline carrier.

Area monitored :90°N - 90°S, 180°W - 180°E.

Standard of comparison :Background field from UKMO global model.

Observation times :All hours combined.

Level(s) monitored :300.0 - 150.0 hPa

Elements monitored :TEMP in °C ; WIND in $m\ s^{-1}$

Parameters monitored

:N REP. :Number of observations received excluding duplicates.

:PG :Percentage of observations with gross errors.

:PR :Percentage of observations rejected by quality control including rejections from the duplicate check.

:PC :Percentage of observations with calm winds.

:RMS :Root Mean Square difference of observations from background values excluding those with gross errors in Temperature & vector wind.

:BIAS :Mean difference of observations from background values excluding those with gross errors in Temperature & Wind Speed.

GROSS ERROR LIMITS :10.0 °C ; 60 $m\ s^{-1}$ Vector Wind

SELECTION CRITERIA :N REP ≥ 20

NB: All American ACARS data are grouped together and statistics are shown at the bottom of the table as "US ACARS".

	TEMPERATURE					WIND					
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
AAH	3704	1	42	1.6	0.0	3672	0	42	0	7.2	0.9
AAL	6439	1	40	1.6	0.2	6256	0	40	0	7.0	0.8
AAR	1391	1	7	1.9	-0.6	1395	0	8	0	8.4	0.1
ACA	2191	1	12	1.6	-0.1	2100	0	13	0	8.6	0.6
ACI	143	1	11	1.5	0.3	147	0	12	0	7.6	1.0
ADB	21	0	10	1.5	-0.9	22	0	14	0	13.9	0.4
AEA	1045	1	4	1.8	0.2	650	0	4	0	7.8	0.0
AEL	651	2	10	2.0	0.4	546	0	10	0	8.6	1.1
AEW	73	0	3	1.8	-0.4	74	4	14	0	9.8	0.8
AFL	582	1	2	1.7	0.3	480	1	5	0	9.1	0.7
AFR	1706	1	6	1.4	0.1	1429	0	7	0	7.5	0.6
AJM	426	0	1	1.4	-0.2	383	0	2	0	7.3	0.4
AJX	351	0	11	2.2	0.8	355	0	9	0	10.7	-0.2
AMM	77	0	3	1.9	0.8	70	0	4	0	8.1	0.2
AMT	1824	0	45	1.4	0.0	1809	0	45	0	6.7	0.7
AMX	395	2	5	1.7	0.5	328	0	7	0	10.4	0.2
ANA	64	6	19	3.0	0.4	67	0	4	0	9.0	0.2
ANZ	5601	0	26	1.1	0.2	5576	0	26	0	6.3	0.5
ARG	31	3	35	2.5	1.0	27	0	30	0	8.1	-1.1
ATN	172	1	100	4.1	-2.5	166	1	30	0	11.8	2.2
AVA	282	1	5	1.9	0.9	198	1	6	0	9.2	0.7
AVN	156	0	47	1.1	0.0	158	1	48	0	5.6	-0.6
AXF	26	12	35	0.7	0.3	23	0	22	0	4.6	-1.3
AZA	817	2	8	1.9	0.1	706	1	8	0	8.3	0.5
BAL	429	0	9	1.4	0.3	357	0	10	0	7.7	0.8
BAW	886	1	20	1.9	-0.3	817	0	20	0	8.0	0.5
BBR	226	3	7	1.9	0.5	144	0	3	0	9.4	0.2
BHP	51	0	10	2.0	-0.6	44	0	11	0	8.9	1.0
BPA	443	9	100	2.7	0.9	405	1	11	0	9.5	0.1
BSK	49	4	10	1.7	-0.4	49	2	22	0	12.6	-0.4
BWA	287	0	7	1.8	-0.1	215	0	5	0	7.5	1.1
CAL	68	0	9	2.5	0.2	69	0	9	0	8.7	-0.9
CCA	348	3	18	2.5	0.0	359	1	100	0	15.0	-0.7
CES	240	3	10	2.0	-0.2	238	1	11	0	9.5	0.3
CFC	35	0	11	1.8	-0.2	32	0	13	0	9.2	1.7
CFG	968	0	4	1.5	-0.1	879	0	6	0	7.7	0.3
CKK	190	1	4	1.6	0.4	190	0	5	0	8.8	-0.4
CKS	797	3	40	1.5	0.4	791	0	39	0	7.9	0.8
CLX	374	0	3	1.5	-0.4	291	0	6	0	8.3	0.2
COA	218	1	28	1.6	0.2	187	1	28	0	9.6	0.4
CPA	43	0	12	1.0	0.4	43	0	12	0	6.7	0.4
CRL	939	1	4	1.6	0.6	781	0	6	0	8.5	0.6
CSA	30	0	0	1.2	-0.3	22	0	5	0	10.7	-0.9
CSN	94	2	13	1.9	0.3	95	1	72	0	8.4	0.3
CUB	211	2	8	1.9	0.1	186	1	11	0	11.8	0.6
DAL	2948	0	39	1.5	0.0	2850	0	41	0	7.0	0.6
DCE	253	0	9	1.4	-0.6	235	0	10	0	6.8	0.0
DCS	27	0	0	1.1	-0.1	26	0	4	0	6.3	0.0
DHL	156	3	100	6.4	-6.1	153	0	61	0	12.1	0.5
DLH	1092	0	15	1.6	-0.1	1001	0	15	0	7.4	1.1
EDW	126	1	3	1.4	-0.1	115	0	3	0	8.6	0.7
EEZ	141	1	9	1.7	0.3	121	0	8	0	8.7	0.0
EIA	376	3	58	2.9	0.9	370	0	100	0	18.0	3.7
ELY	247	0	3	1.6	0.2	247	0	3	0	7.3	0.2
ETH	24	0	17	1.1	0.3	24	0	17	0	5.3	0.6
EVA	120	0	13	1.6	-0.3	126	1	15	0	9.8	-0.1
FDX	1947	1	46	1.5	0.3	1958	0	46	0	8.3	0.5
FIN	211	0	3	1.4	0.2	199	0	6	0	6.5	0.3
FJI	805	2	35	1.5	0.9	794	0	34	0	6.6	0.7

		TEMPERATURE						WIND			
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
FOM	690	1	29	1.4	0.2	684	0	29	0	6.8	0.9
FWI	169	2	7	1.8	-0.1	165	0	7	0	9.2	0.7
GAF	23	0	0	1.6	-1.1	26	0	8	0	8.6	-0.5
GCO	282	1	8	1.5	-0.1	287	1	11	0	9.2	1.7
GHA	105	0	3	1.5	-0.4	87	1	11	0	13.7	3.1
GRL	73	0	7	2.4	0.7	66	0	2	0	5.1	1.4
GTI	300	4	64	2.3	0.6	298	0	19	0	9.6	0.4
HAL	5134	0	42	1.4	0.0	5106	0	43	0	7.7	0.9
HLN	289	0	29	1.5	0.3	279	0	31	0	8.5	0.8
HRH	278	0	53	1.0	0.4	277	0	53	0	7.9	0.7
IBE	3132	1	5	1.6	0.2	2282	0	6	0	8.3	0.5
ICE	683	0	3	1.5	-0.3	649	0	4	0	7.6	0.9
IWD	245	0	3	1.8	0.1	173	0	2	0	5.8	0.3
JAL	3234	0	5	1.6	0.3	3226	0	6	0	8.0	0.3
JAZ	725	0	6	1.7	0.9	717	0	6	0	7.0	0.3
JBU	36	3	3	0.9	0.0	36	0	0	0	4.5	0.7
KAI	32	6	41	2.5	1.5	32	0	34	0	7.4	0.7
KAL	2562	1	13	1.8	0.0	2569	0	13	0	7.8	0.3
KLM	1580	0	4	1.7	0.2	1372	0	4	0	7.0	0.6
LAN	542	0	3	1.3	-0.1	539	0	3	0	5.7	1.4
LAP	63	2	41	2.3	1.6	62	0	40	0	8.1	0.2
LDA	60	0	43	4.4	2.9	54	0	9	0	6.7	-0.5
LDI	567	1	48	1.4	0.0	452	0	4	0	8.3	0.5
LNE	91	3	9	1.4	-0.3	68	0	7	0	8.8	1.5
LOT	115	0	3	1.8	-1.2	103	1	7	0	9.3	0.7
LTU	1030	0	4	1.6	0.0	867	0	5	0	7.9	0.6
MAS	234	0	12	2.1	0.5	238	2	9	0	7.2	-0.1
MON	84	0	46	3.4	1.7	65	2	5	0	5.5	0.4
MPD	346	1	2	1.5	-0.1	242	0	2	0	7.2	0.2
MPH	703	0	3	1.6	-0.8	647	0	5	0	8.5	-0.4
MXA	44	5	11	2.3	0.3	46	0	7	0	13.0	-0.5
MYT	303	1	3	1.8	0.4	255	0	3	0	7.0	0.2
NAO	462	0	28	1.4	-0.2	456	0	30	0	8.8	0.9
NCA	987	0	3	1.7	0.2	731	0	4	0	6.7	0.8
NVR	26	0	4	1.1	-0.4	26	0	8	0	9.3	-0.9
NWA	7593	1	12	1.7	0.1	7548	0	13	0	7.9	0.4
NZL	3818	0	16	1.0	0.1	3818	0	16	0	5.3	0.5
OAE	683	0	40	1.4	-0.4	675	0	46	0	10.0	1.7
PAC	458	1	17	1.6	-0.3	465	0	17	0	8.1	0.3
PAL	1705	0	13	1.6	0.1	1614	0	16	0	9.2	0.7
PAO	432	0	54	1.4	0.1	434	1	54	0	5.4	0.6
PLM	238	0	5	2.2	1.4	138	0	4	0	8.5	-0.3
QFA	4058	0	44	1.2	0.4	4054	0	44	0	5.8	0.4
QQA	49	2	47	0.9	0.6	49	0	45	0	7.0	0.6
RAF	20	0	5	1.3	1.1	20	0	5	0	5.2	1.5
RAM	207	1	6	1.9	0.6	130	1	6	0	10.7	-0.9
RCH	322	1	100	3.3	-0.1	244	0	100	0	12.9	2.5
RJA	43	0	9	2.1	-0.5	42	0	10	0	9.4	1.2
RRR	48	0	8	1.7	-0.6	42	0	10	0	9.1	0.7
RZO	374	1	2	1.3	-0.4	200	0	3	0	6.9	0.5
SAA	373	1	3	1.6	-0.7	312	0	3	0	9.2	1.2
SEU	437	0	3	1.8	0.2	399	1	3	0	7.6	0.8
SIA	411	0	2	1.2	0.7	409	0	2	0	5.0	0.3
SLR	319	0	8	1.3	-0.4	303	0	8	0	6.6	0.7
SQC	40	0	0	1.6	1.1	40	0	0	0	6.0	-0.3
SSV	28	0	7	2.1	0.4	25	0	4	0	11.0	-0.3
TAG	59	0	27	2.1	0.0	56	0	30	0	7.2	1.9
TAM	69	7	30	2.6	1.0	67	0	28	0	17.8	0.1
TAP	518	1	9	2.0	-0.1	248	0	10	0	10.3	0.3

	TEMPERATURE					WIND					
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
TCV	34	0	29	4.8	3.1	28	0	4	0	9.3	-1.4
TCX	145	1	6	1.4	0.4	134	0	7	0	7.6	1.2
THA	131	2	6	1.8	-0.4	132	0	4	0	5.3	0.0
THT	110	3	35	1.7	0.2	108	0	32	0	7.6	1.6
TPA	39	0	5	1.6	0.4	35	3	6	0	10.7	2.6
TSC	33	3	6	2.2	-0.2	30	0	0	0	5.7	-0.1
UAE	590	0	6	1.2	0.2	591	0	6	0	5.2	0.8
UAL	161968	0	94	1.2	-0.3	162169	0	94	0	5.2	0.5
UPS	1554	1	54	1.4	0.0	1531	0	55	0	7.4	1.1
USA	211	3	6	1.5	0.2	187	0	6	0	8.0	0.8
VHF	30	0	0	0.7	-0.2	30	0	0	0	5.0	-0.3
VIR	199	0	3	1.6	-0.2	179	0	3	0	8.4	1.0
VPB	25	0	12	2.2	0.2	24	0	17	0	12.4	-0.4
VRG	157	6	32	2.4	1.0	155	1	100	0	15.3	1.1
VVR	60	0	25	1.8	-0.2	56	0	23	0	7.1	0.6
WOA	458	0	12	1.4	0.2	438	0	15	0	7.7	0.4
XLA	82	0	1	1.1	0.5	72	0	3	0	7.2	1.5
YSS	86	0	1	1.8	1.0	65	0	0	0	6.9	1.3

	TEMPERATURE					WIND					
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
AU	43940	0	10	1.1	0.6	43955	0	10	0	5.2	0.4
EU	177387	0	24	1.3	0.3	177387	0	23	0	4.8	0.5
KL	2021	0	1	1.3	0.7	2021	0	1	0	5.9	0.5
MK	3206	0	7	1.6	1.3	3190	0	7	0	6.4	1.1
SA	4624	0	45	1.8	1.4	4504	0	9	0	6.0	0.1
TN	43	0	35	1.8	0.0	37	0	38	0	6.7	0.8
N	1306	1	30	2.3	0.2	1342	0	31	0	8.9	1.3
US ACARS	913404	0	62	1.3	0.2	913397	0	62	0	5.3	0.6

TABLE 4B

MONTHLY MONITORING OF AIRCRAFT OBSERVATIONS
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures		
Period		:One calendar month.
Data monitored		:Statistics for each airline carrier.
Area monitored		:90°N - 90°S, 180°W - 180°E.
Standard of comparison		:Background field from UKMO global model.
Observation times		:All hours combined.
Level(s) monitored		:1000.0 – 300.1 hPa
Elements monitored		:TEMP in °C ; WIND in m s^{-1}
Parameters monitored		
	:N REP.	:Number of observations received excluding duplicates.
	:PG	:Percentage of observations with gross errors.
	:PR	:Percentage of observations rejected by quality control including rejections from the duplicate check.
	:PC	:Percentage of observations with calm winds.
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors in Temperature & vector wind.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors in Temperature & Wind Speed.
GROSS ERROR LIMITS		:10.0 °C ; 60 m s^{-1} Vector Wind
SELECTION CRITERIA		:N REP ≥ 20

NB: All American ACARS data are grouped together and statistics are shown at the bottom of the table as "US ACARS".

		TEMPERATURE						WIND			
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
AAL	487	0	40	1.7	-0.3	471	0	39	0	6.1	0.5
ACA	52	0	25	1.4	0.0	52	0	27	0	9.1	-1.1
AFR	108	3	6	1.8	-0.6	95	0	5	0	8.8	1.4
AMT	59	2	24	1.5	-0.3	60	0	23	0	6.6	1.0
ANZ	194	0	19	1.0	0.0	194	0	18	0	4.6	0.7
AXF	36	0	64	0.9	0.5	34	0	65	0	7.7	0.2
AZA	37	0	19	2.6	1.5	34	0	35	0	16.6	2.7
BAF	23	4	13	1.6	0.6	23	0	13	0	9.4	1.3
CFC	106	2	12	1.1	0.3	96	0	14	0	7.0	-0.2
CFG	38	5	13	2.0	-0.9	33	3	12	0	7.6	1.2
CKS	59	10	20	2.2	-0.2	57	0	14	0	8.7	-1.1
CRL	53	0	2	1.3	0.5	48	0	4	0	6.8	1.5
DAL	209	0	44	1.4	0.0	204	0	46	0	8.1	0.1
DHL	40	0	100	6.0	-5.8	40	0	78	0	12.7	-1.5
DLH	337	1	15	1.4	-0.2	334	0	15	0	6.7	0.3
ELY	21	0	5	1.6	-0.3	21	0	5	0	8.2	1.7
FDX	532	1	26	1.4	0.1	534	0	27	0	9.6	0.2
FIN	29	0	3	1.8	-0.4	28	0	0	0	5.6	-0.2
GCO	100	0	3	1.7	0.0	101	0	8	0	8.7	0.6
GTI	38	0	45	2.5	-0.4	40	0	5	0	7.9	0.0
HAL	360	1	42	1.5	-0.3	360	0	42	0	7.7	1.5
IBE	57	2	5	1.9	-0.2	50	0	6	0	7.9	1.1
ICE	35	0	3	1.6	-0.8	32	0	9	0	11.4	2.2
JAL	81	2	5	1.6	0.4	81	0	5	0	7.5	1.9
JAZ	47	9	11	2.2	1.6	45	0	7	0	8.7	1.3
KAL	60	0	18	1.7	-0.7	60	0	18	0	5.1	0.0
KIW	115	6	50	3.5	0.1	111	0	12	0	8.5	-0.6
KLM	67	0	1	1.3	-0.2	65	0	2	0	6.1	0.3
LAN	37	0	14	1.4	0.4	39	3	18	0	8.0	0.3
MAS	20	0	15	1.6	-0.5	20	5	20	0	5.4	0.0
MPH	130	1	2	1.3	-0.5	119	0	5	0	8.3	-0.7
NCA	73	0	11	1.8	-0.1	58	0	14	0	10.6	0.7
NWA	478	0	15	1.8	0.2	474	0	14	0	7.3	0.5
NZL	24285	0	58	1.3	0.2	24284	0	58	0	5.0	0.2
OAE	73	0	32	1.1	-0.6	69	0	45	0	11.2	2.5
PAC	52	0	10	1.5	-0.5	52	0	13	0	7.9	0.4
QFA	225	0	44	1.5	0.1	225	0	42	0	5.9	1.0
RCH	64	3	100	2.2	0.5	56	0	100	0	10.5	1.4
RRR	95	19	36	3.0	1.9	81	0	20	0	13.1	1.2
SAA	56	5	7	1.6	-1.1	55	0	2	0	5.5	-1.1
SFR	22	9	59	3.0	1.8	20	0	20	0	10.6	1.6
SIA	48	0	6	1.5	0.5	50	0	4	0	5.5	0.3
SKI	103	13	49	3.9	-1.1	92	0	18	0	13.9	2.2
UAE	82	0	1	1.1	0.5	82	0	2	0	5.8	0.4
UAL	325590	0	99	1.2	-0.1	325328	0	99	0	4.6	0.3
UPS	364	0	42	1.2	-0.1	350	1	42	0	8.3	0.9
VDA	25	0	8	1.3	-0.1	25	0	32	0	22.1	-4.7
VVP	38	8	55	4.5	-3.7	41	2	32	0	7.7	2.2
WOA	225	1	8	1.1	0.1	213	0	9	0	9.2	0.5

		TEMPERATURE						WIND			
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
AU	32807	0	50	1.3	0.3	32817	0	50	0	4.3	0.0
EU	580306	0	68	1.1	0.2	580183	0	68	0	4.1	0.0
KL	1233	0	55	1.4	0.0	1233	0	55	0	5.2	0.0
MK	2202	0	54	1.4	0.6	2190	0	54	0	4.5	0.8
SA	2929	0	69	1.8	0.5	2780	0	56	0	4.7	0.2

		TEMPERATURE						WIND			
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
US ACARS	1754486	0	78	1.2	0.3	1749644	0	78	0	4.4	0.2

Figure 3a. AIRCRAFT 300 - 150 hPa mean daily count. DECEMBER 2003
Observations with O-B vector difference greater than 60 ms-1 excluded
Global average number of observations in 24 hours = 45085

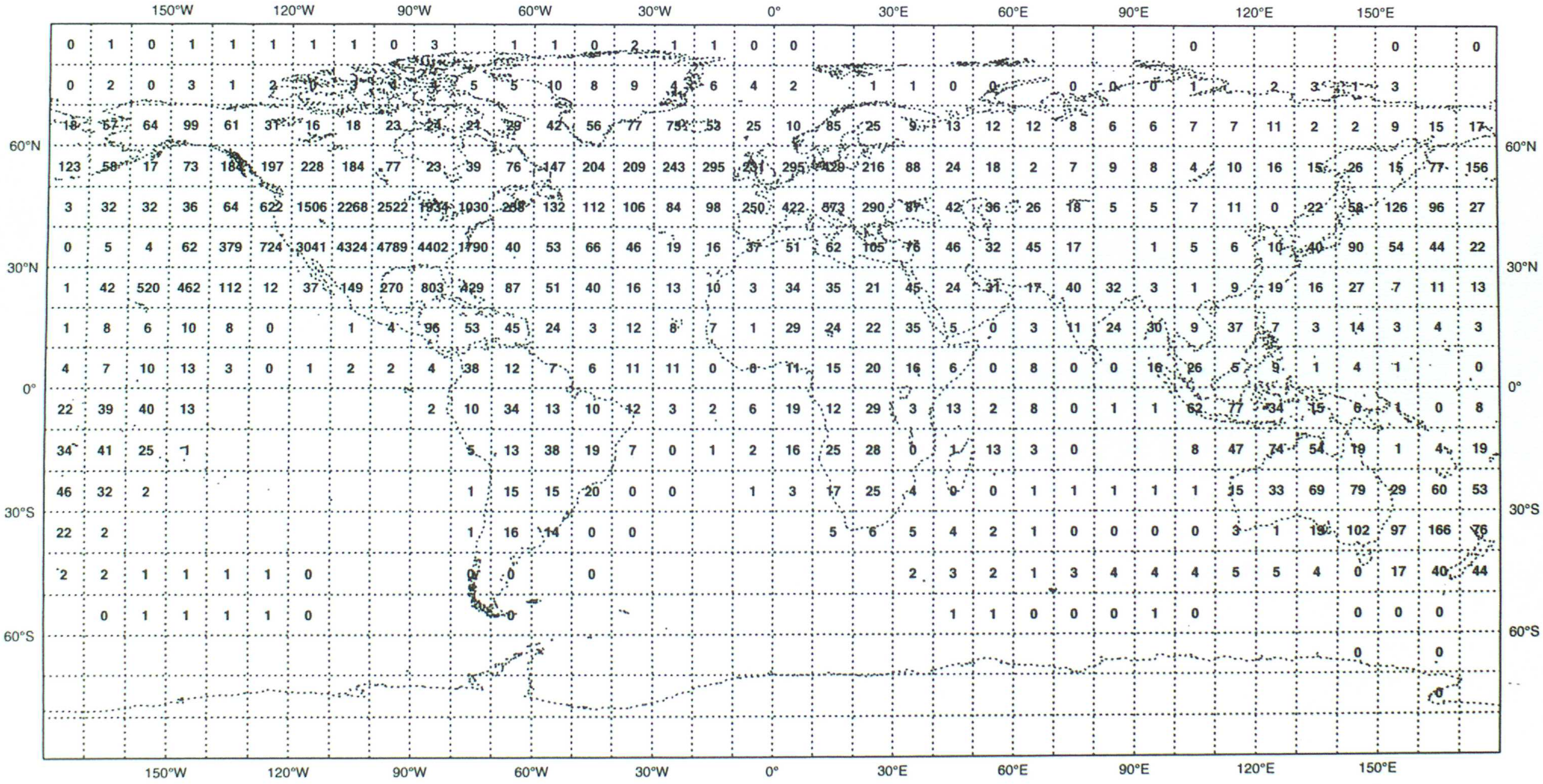

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

Figure 3b. AIRCRAFT 1000 - 301 hPa mean daily count. DECEMBER 2003
Observations with O-B vector difference greater than 60 ms-1 excluded
Global average number of observations in 24 hours = 87872

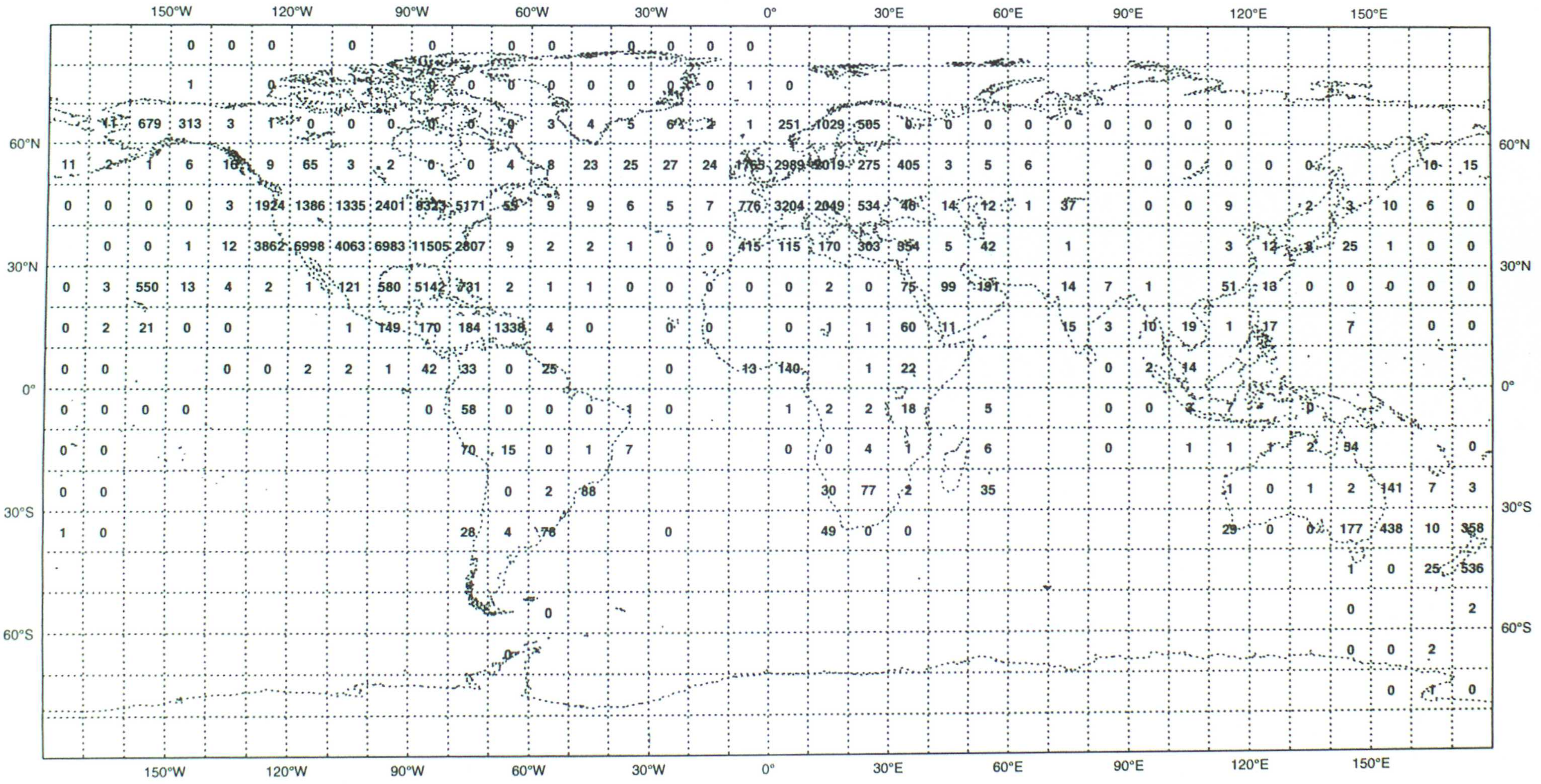

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
0 0 0 0 0 0 0 0 0 0 0 0
1 0 0 0 0 0 0 0 0 0 1 0
11 679 313 3 1 0 0 0 0 0 0 3 4 5 6 2 1 251 1029 505 0 0 0 0 0 0 0 0 0
11 2 1 6 16 9 65 3 2 0 0 4 8 23 25 27 24 1765 2989 4019 275 405 3 5 6 0 0 0 0 0 16 15
0 0 0 0 3 1924 1386 1335 2401 8323 5171 55 9 9 6 5 7 776 3204 2049 534 46 14 12 1 37 0 0 9 2 3 10 6 0
0 0 1 12 3862 6998 4063 6983 11505 2807 9 2 2 1 0 0 415 115 170 303 854 5 42 1 3 12 3 25 1 0 0
0 3 550 13 4 2 1 121 580 5142 731 2 1 1 0 0 0 0 0 2 0 75 99 191 14 7 1 51 18 0 0 0 0 0
0 2 21 0 0 1 149 170 184 1338 4 0 0 0 0 1 1 60 11 15 3 10 19 1 17 7 0 0
0 0 0 0 2 2 1 42 33 0 25 0 13 140 1 22 0 2 14
0 0 0 0 0 58 0 0 0 1 0 1 2 2 18 5 0 0 2 7 0
0 0 70 15 0 1 7 0 0 4 1 6 0 1 1 1 2 94 0
0 0 0 2 88 30 77 2 35 1 0 1 2 141 7 3
1 0 28 4 76 0 49 0 0 29 0 0 177 438 10 358
1 0 25 536
0 0 2
0 0 2
0 1 0

Figure 4a. AIRCRAFT 300 - 150 hPa mean winds. DECEMBER 2003
Observations with O-B vector difference greater than 60 ms-1 excluded
Arrows are plotted where greater than 30 obs are present

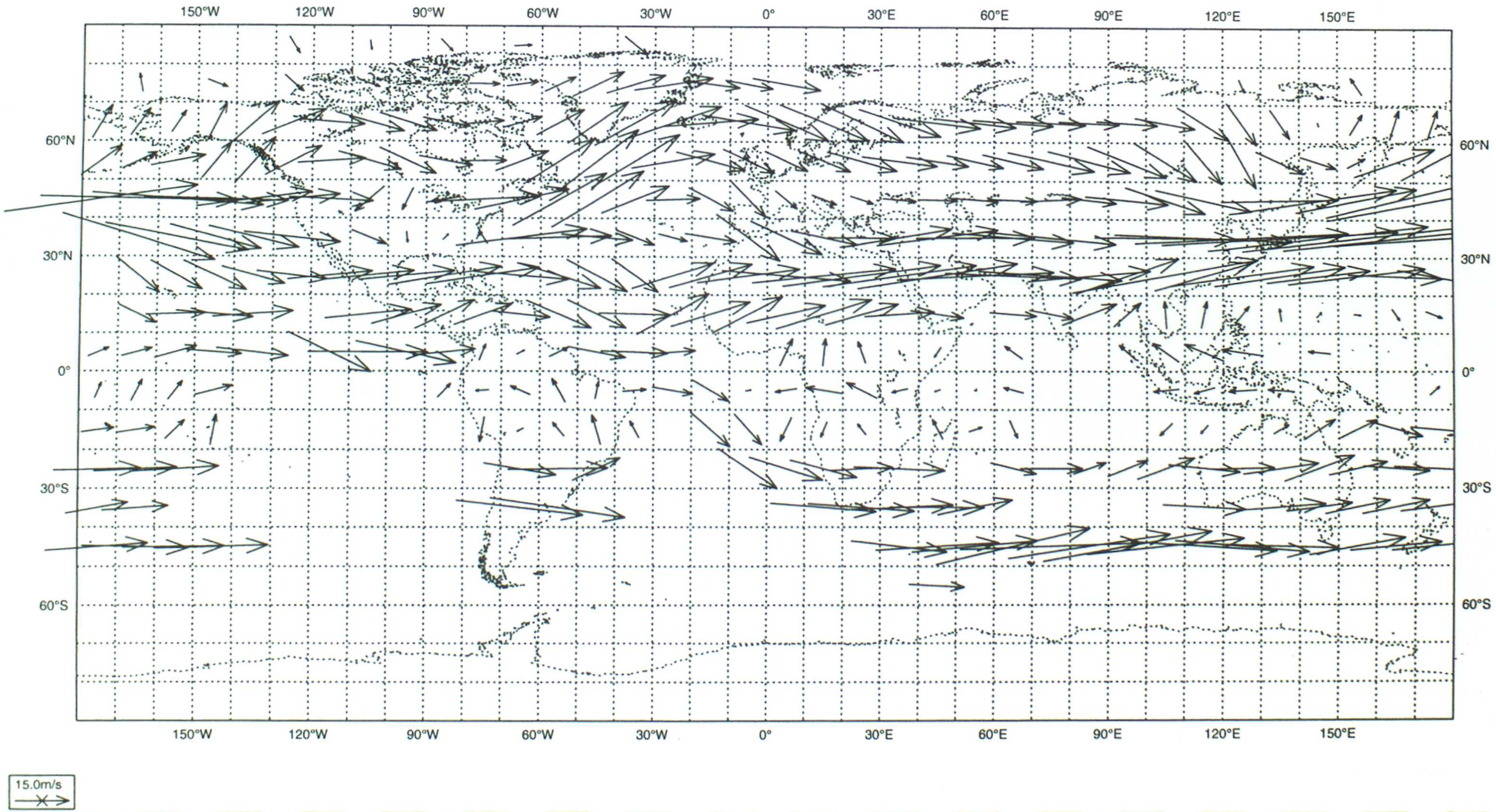

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
15.0m/s

Figure 4b. AIRCRAFT 1000 - 301 hPa mean winds. DECEMBER 2003
Observations with O-B vector difference greater than 60 ms-1 excluded
Arrows are plotted where greater than 30 obs are present

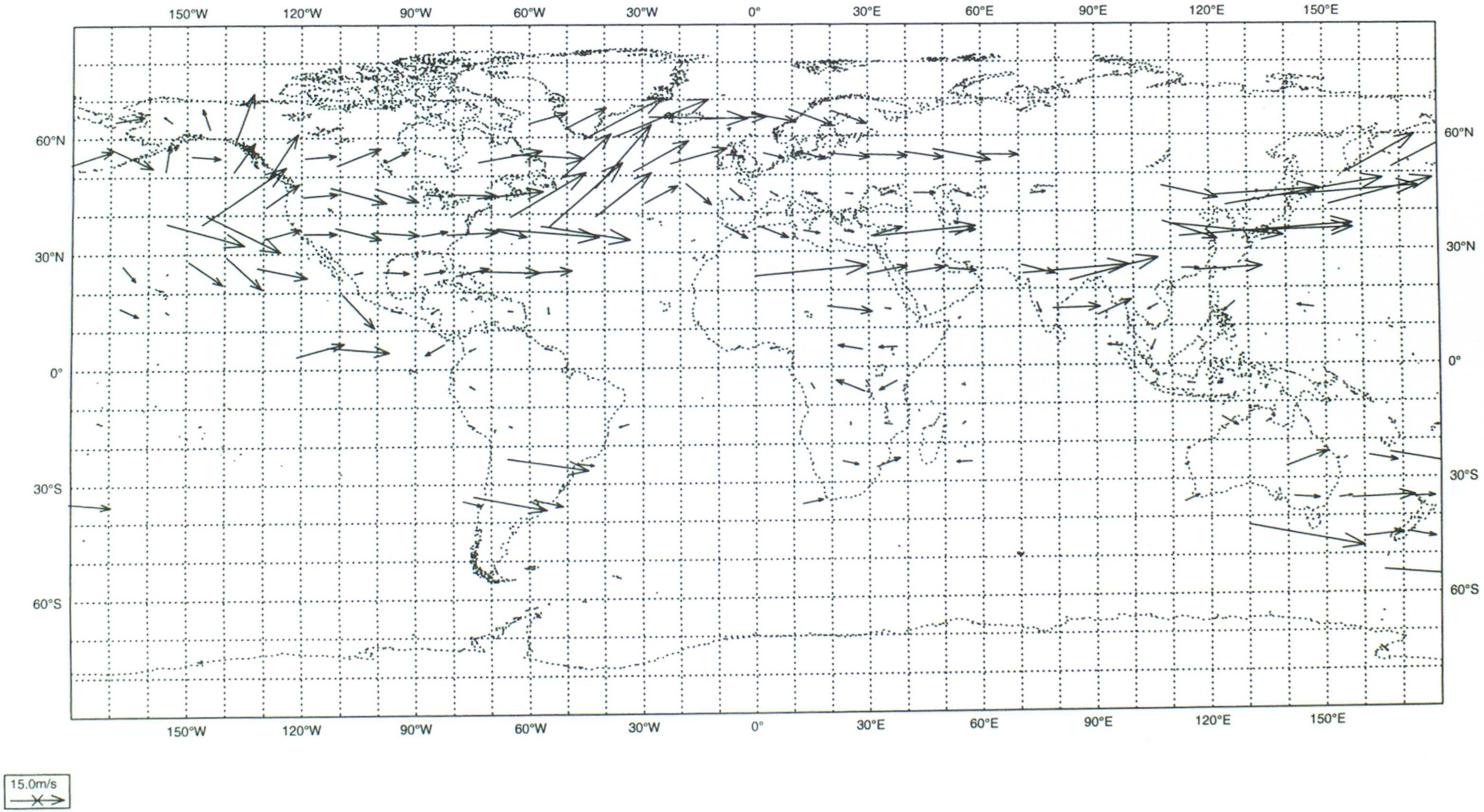

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
15.0m/s

Figure 5a. AIRCRAFT 300 - 150 hPa mean O-B winds. DECEMBER 2003
Observations with O-B vector difference greater than 60 ms-1 excluded
Arrows are plotted where greater than 30 obs are present

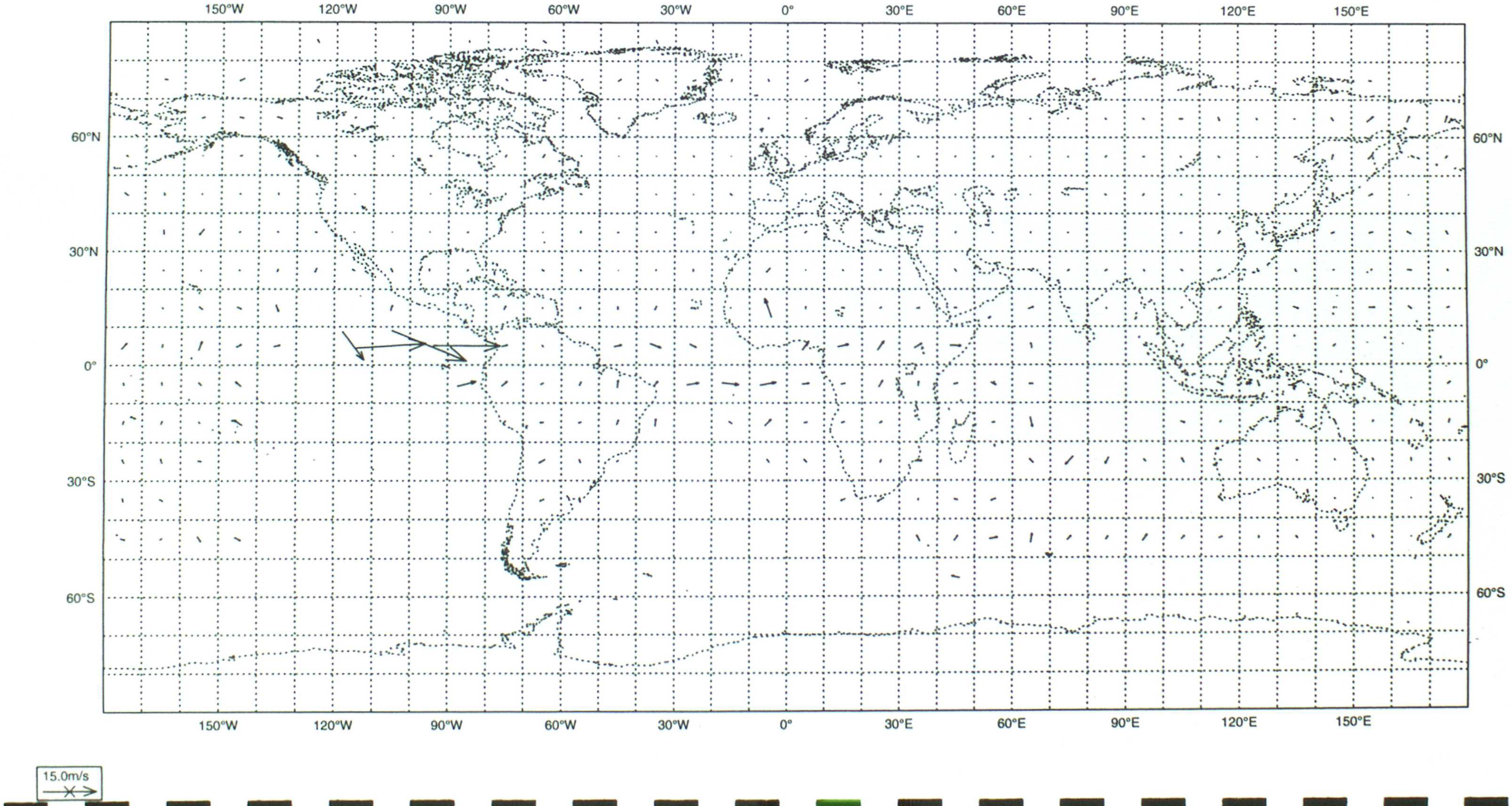

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
15.0m/s

Figure 5b. AIRCRAFT 1000 - 301 hPa mean O-B winds. DECEMBER 2003
Observations with O-B vector difference greater than 60 ms-1 excluded
Arrows are plotted where greater than 30 obs are present

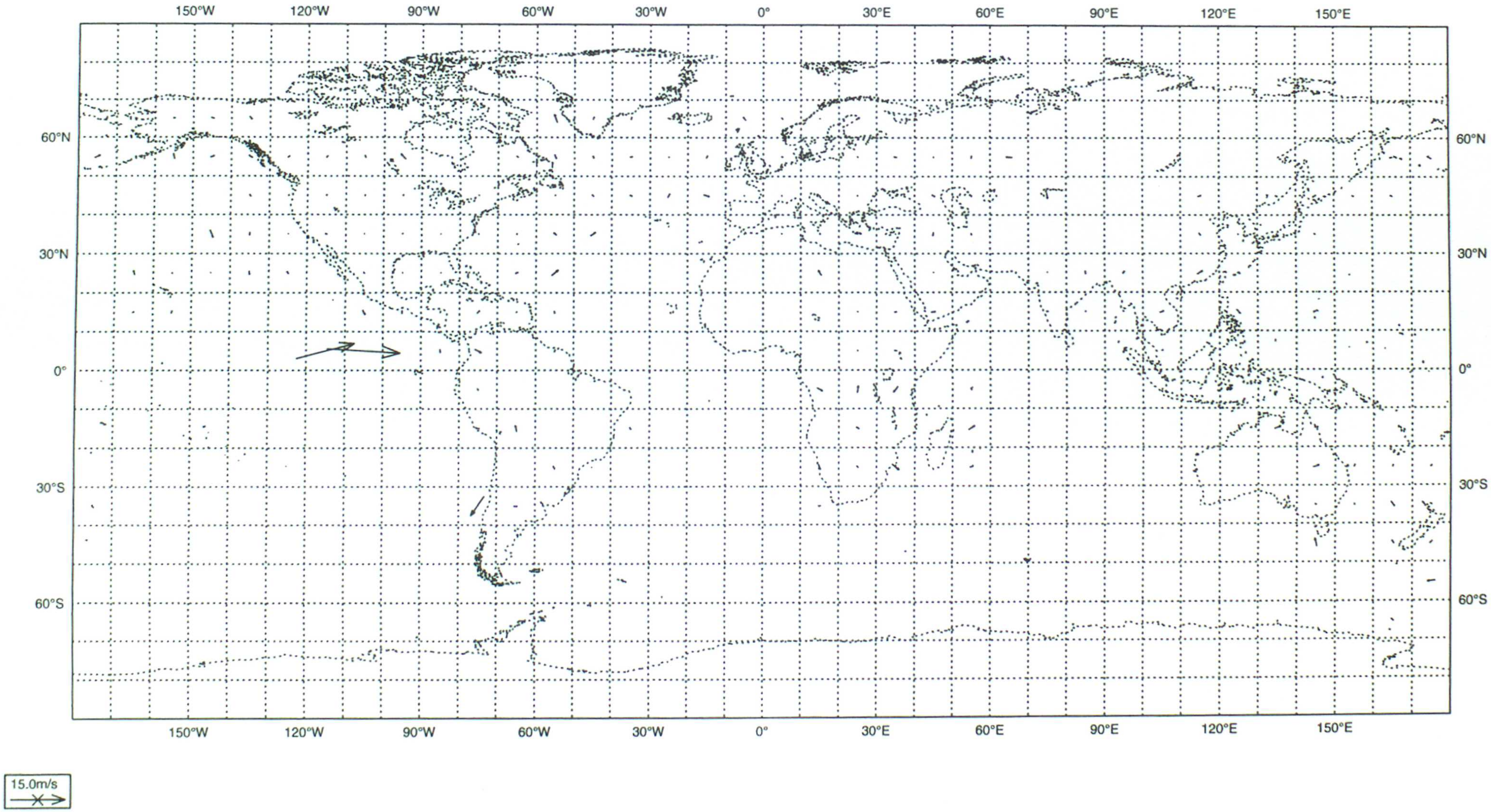

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
15.0m/s

Figure 6a. AIRCRAFT 300 - 150 hPa mean O-B speeds (ms-1). DECEMBER 2003
Observations with O-B vector difference greater than 60 ms-1 excluded
Values are printed where greater than 30 obs are present

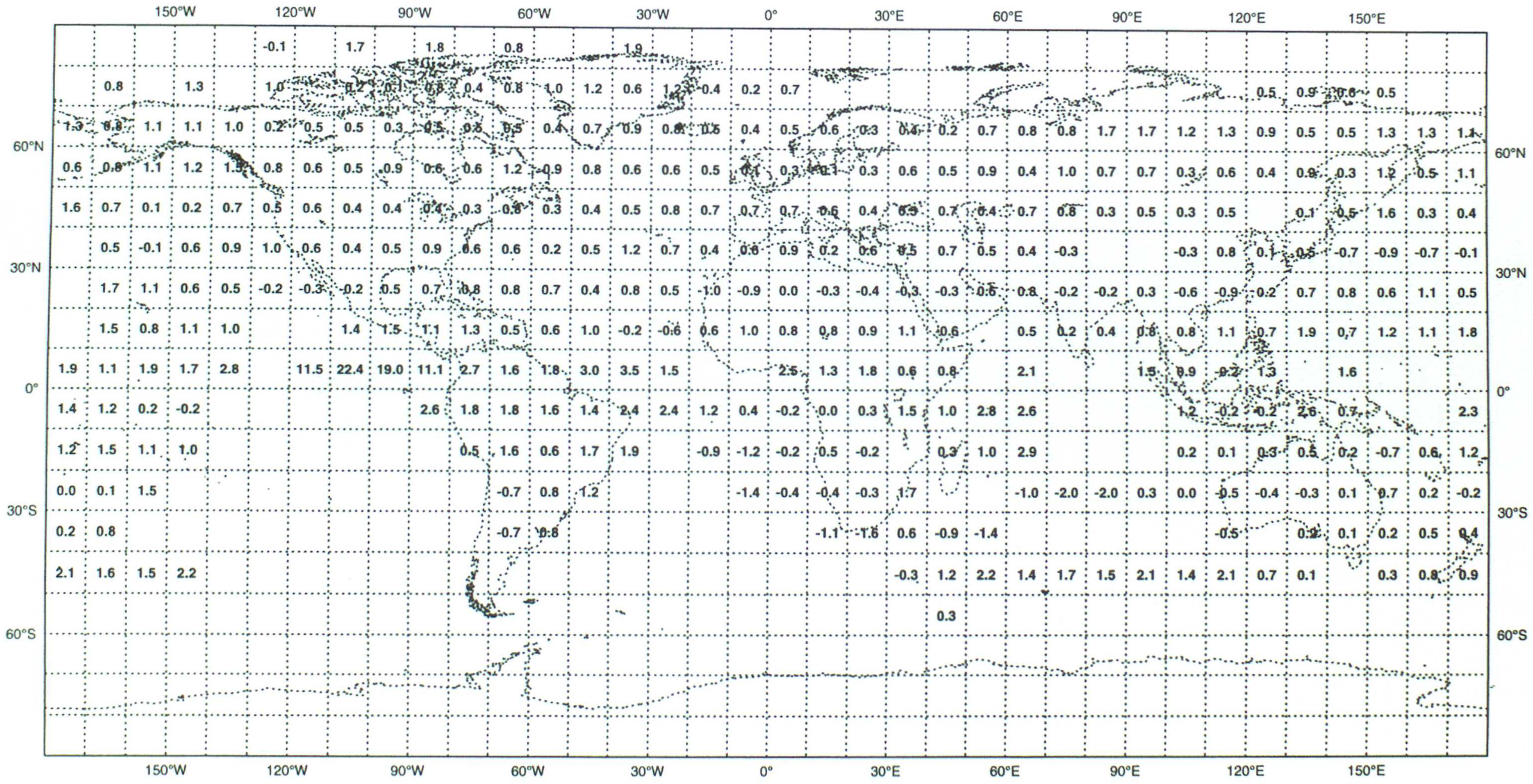

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
-0.1 1.7 1.8 0.8 1.9
0.8 1.3 1.0 0.2 0.1 0.8 0.4 0.8 1.0 1.2 0.6 1.2 -0.4 0.2 0.7 0.5 0.9 0.6 0.5
1.3 0.8 1.1 1.1 1.0 0.2 0.5 0.5 0.3 0.5 0.5 0.5 0.4 0.7 0.9 0.8 0.5 0.4 0.5 0.6 0.3 0.4 0.2 0.7 0.8 0.8 1.7 1.7 1.2 1.3 0.9 0.5 0.5 1.3 1.3 1.1
0.6 0.8 1.1 1.2 1.5 0.8 0.6 0.5 0.9 0.6 0.6 1.2 -0.9 0.8 0.6 0.6 0.5 0.1 0.3 0.1 0.3 0.6 0.5 0.9 0.4 1.0 0.7 0.7 0.3 0.6 0.4 0.9 0.3 1.2 0.5 1.1
1.6 0.7 0.1 0.2 0.7 0.5 0.6 0.4 0.4 0.4 0.3 0.8 0.3 0.4 0.5 0.8 0.7 0.7 0.7 0.6 0.4 0.9 0.7 0.4 0.7 0.8 0.3 0.5 0.3 0.5 0.1 0.5 1.6 0.3 0.4
0.5 -0.1 0.6 0.9 1.0 0.6 0.4 0.5 0.9 0.6 0.6 0.2 0.5 1.2 0.7 0.4 0.6 0.9 0.2 0.6 0.5 0.7 0.5 0.4 -0.3 -0.3 0.8 0.1 0.5 -0.7 -0.9 -0.7 -0.1
1.7 1.1 0.6 0.5 -0.2 -0.3 -0.2 0.5 0.7 0.8 0.8 0.7 0.4 0.8 0.5 -1.0 -0.9 0.0 -0.3 -0.4 -0.3 -0.3 0.6 0.8 -0.2 -0.2 0.3 -0.6 -0.9 -0.2 0.7 0.8 0.6 1.1 0.5
1.5 0.8 1.1 1.0 1.4 1.5 1.1 1.3 0.5 0.6 1.0 -0.2 -0.6 0.6 1.0 0.8 0.8 0.9 1.1 0.6 0.5 0.2 0.4 0.8 0.8 1.1 0.7 1.9 0.7 1.2 1.1 1.8
1.9 1.1 1.9 1.7 2.8 11.5 22.4 19.0 11.1 2.7 1.6 1.8 3.0 3.5 1.5 2.5 1.3 1.8 0.6 0.8 2.1 1.5 0.9 -0.2 1.3 1.6
1.4 1.2 0.2 -0.2 2.6 1.8 1.8 1.6 1.4 2.4 2.4 1.2 0.4 -0.2 0.0 0.3 1.5 1.0 2.8 2.6 1.2 -0.2 -0.2 2.6 0.7 2.3
1.2 1.5 1.1 1.0 0.5 1.6 0.6 1.7 1.9 -0.9 -1.2 -0.2 0.5 -0.2 0.3 1.0 2.9 0.2 0.1 0.3 0.5 0.2 -0.7 0.6 1.2
0.0 0.1 1.5 -0.7 0.8 1.2 -1.4 -0.4 -0.4 -0.3 1.7 -1.0 -2.0 -2.0 0.3 0.0 -0.5 -0.4 -0.3 0.1 0.7 0.2 -0.2
0.2 0.8 -0.7 0.8 -1.1 -1.6 0.6 -0.9 -1.4 -0.5 0.2 0.1 0.2 0.5 0.4
2.1 1.6 1.5 2.2 -0.3 1.2 2.2 1.4 1.7 1.5 2.1 1.4 2.1 0.7 0.1 0.3 0.8 0.9
0.3

Figure 6b. AIRCRAFT 1000 - 301 hPa mean O-B speeds (ms-1). DECEMBER 2003
Observations with O-B vector difference greater than 60 ms-1 excluded
Values are printed where greater than 30 obs are present

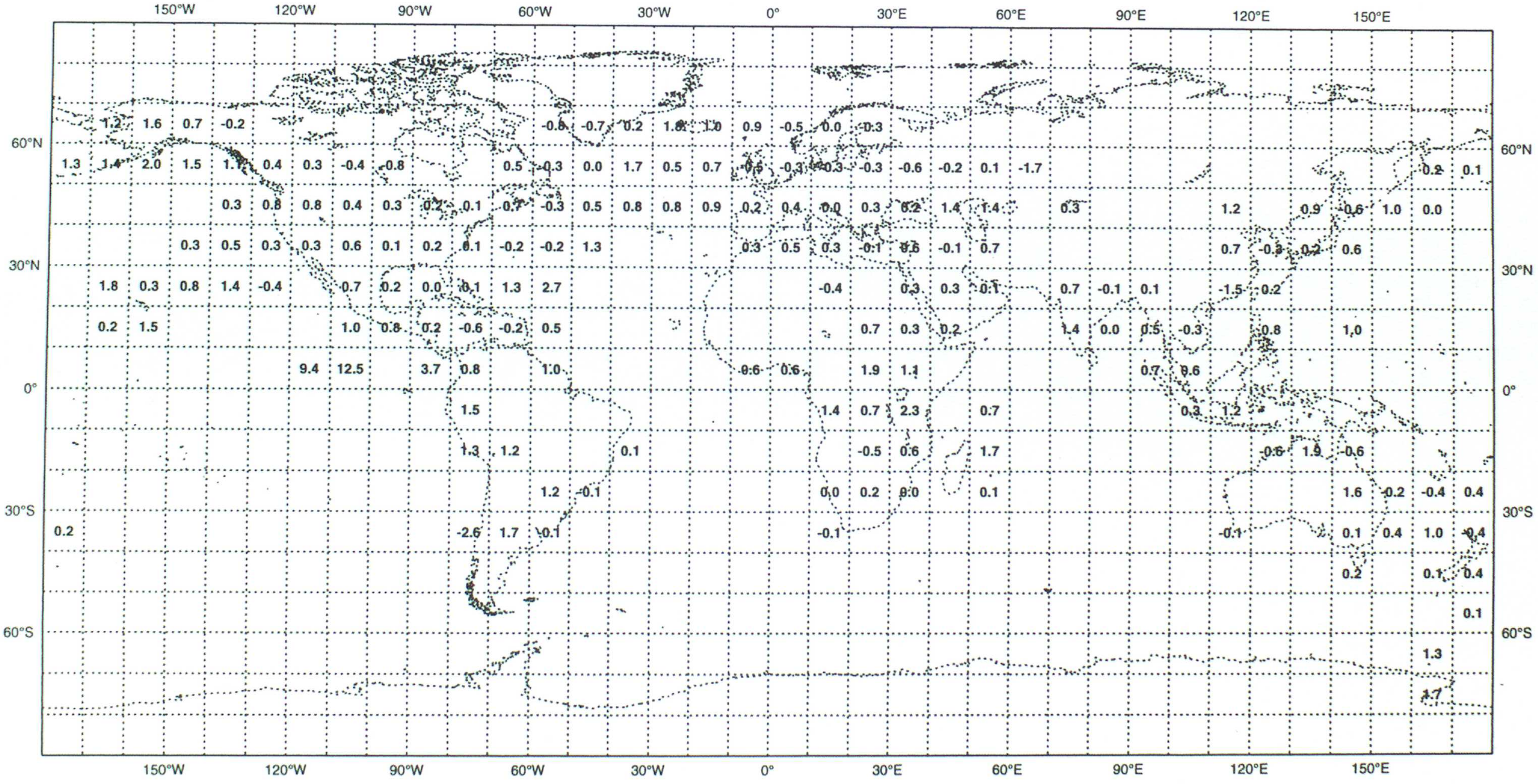

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
1.2 1.6 0.7 -0.2 -0.8 -0.7 0.2 1.8 1.0 0.9 -0.5 0.0 -0.3
1.3 1.4 2.0 1.5 1.1 0.4 0.3 -0.4 -0.8 0.5 -0.3 0.0 1.7 0.5 0.7 0.6 -0.3 -0.3 -0.3 -0.6 -0.2 0.1 -1.7 0.2 0.1
0.3 0.8 0.8 0.4 0.3 0.2 0.1 0.7 -0.3 0.5 0.8 0.8 0.9 0.2 0.4 0.0 0.3 0.2 1.4 1.4 0.3 1.2 0.9 -0.6 1.0 0.0
0.3 0.5 0.3 0.3 0.6 0.1 0.2 0.1 -0.2 -0.2 1.3 0.3 0.5 0.3 -0.1 0.6 -0.1 0.7 0.7 -0.3 0.2 0.6
1.8 0.3 0.8 1.4 -0.4 -0.7 0.2 0.0 0.1 1.3 2.7 -0.4 0.3 0.3 0.1 0.7 -0.1 0.1 -1.5 0.2
0.2 1.5 1.0 0.8 0.2 -0.6 -0.2 0.5 0.7 0.3 0.2 1.4 0.0 0.5 -0.3 0.8 1.0
9.4 12.5 3.7 0.8 1.0 0.6 0.6 1.9 1.1 0.7 0.6
1.5 1.4 0.7 2.3 0.7 0.3 1.2
1.3 1.2 0.1 -0.5 0.6 1.7 0.6 1.9 -0.6
1.2 -0.1 0.0 0.2 0.0 0.1 1.6 -0.2 -0.4 0.4
0.2 -2.6 1.7 0.1 -0.1 -0.1 0.1 0.4 1.0 -0.4
0.2 0.1 0.4
0.1
1.3
1.7

Figure 7a. AIRCRAFT 300 - 150 hPa RMS O-B vector (ms-1). DECEMBER 2003
Observations with O-B vector difference greater than 60 ms-1 excluded
Values are printed where greater than 30 obs are present

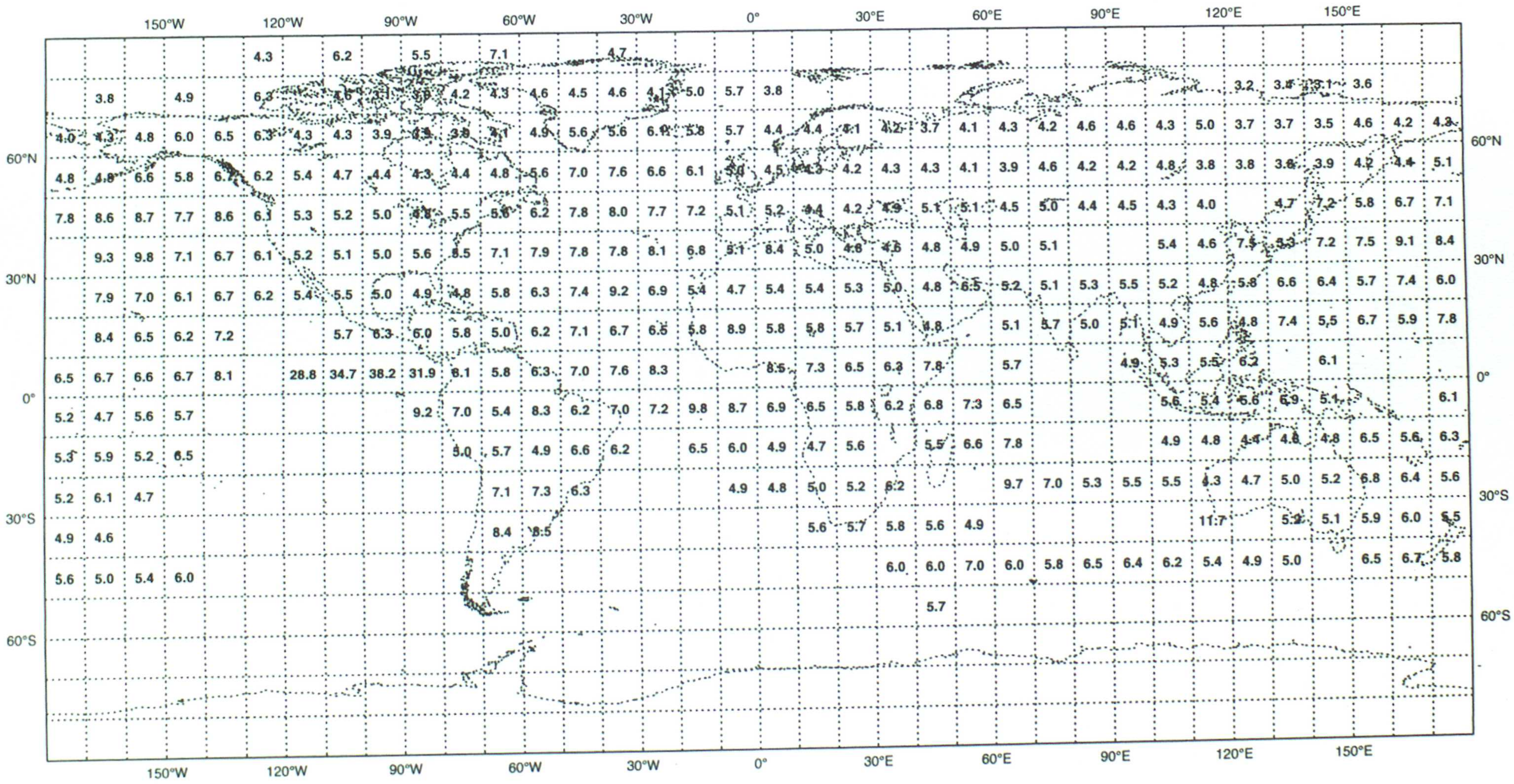

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
4.3 6.2 5.5 7.1 4.7
3.8 4.9 6.3 4.6 3.1 3.9 4.2 4.3 4.6 4.5 4.6 4.1 5.0 5.7 3.8 3.2 3.4 3.1 3.6
4.0 4.3 4.8 6.0 6.5 6.3 4.3 4.3 3.9 3.5 3.8 4.1 4.9 5.6 5.6 6.9 5.8 5.7 4.4 4.4 4.1 4.2 3.7 4.1 4.3 4.2 4.6 4.6 4.3 5.0 3.7 3.7 3.5 4.6 4.2 4.3
4.8 4.8 6.6 5.8 6.7 6.2 5.4 4.7 4.4 4.3 4.4 4.8 5.6 7.0 7.6 6.6 6.1 5.0 4.5 4.3 4.2 4.3 4.3 4.1 3.9 4.6 4.2 4.2 4.8 3.8 3.8 3.8 3.9 4.2 4.4 5.1
7.8 8.6 8.7 7.7 8.6 6.1 5.3 5.2 5.0 4.8 5.5 5.6 6.2 7.8 8.0 7.7 7.2 5.1 5.2 4.4 4.2 4.9 5.1 5.1 4.5 5.0 4.4 4.5 4.3 4.0 4.7 7.2 5.8 6.7 7.1
9.3 9.8 7.1 6.7 6.1 5.2 5.1 5.0 5.6 8.5 7.1 7.9 7.8 7.8 8.1 6.8 5.1 8.4 5.0 4.6 4.6 4.8 4.9 5.0 5.1 5.4 4.6 7.5 5.3 7.2 7.5 9.1 8.4
7.9 7.0 6.1 6.7 6.2 5.4 5.5 5.0 4.9 4.8 5.8 6.3 7.4 9.2 6.9 5.4 4.7 5.4 5.4 5.3 5.0 4.8 6.5 5.2 5.1 5.3 5.5 5.2 4.8 5.8 6.6 6.4 5.7 7.4 6.0
8.4 6.5 6.2 7.2 5.7 6.3 6.0 5.8 5.0 6.2 7.1 6.7 6.5 5.8 8.9 5.8 5.8 5.7 5.1 4.8 5.1 5.7 5.0 5.1 4.9 5.6 4.8 7.4 5.5 6.7 5.9 7.8
6.5 6.7 6.6 6.7 8.1 28.8 34.7 38.2 31.9 8.1 5.8 6.3 7.0 7.6 8.3 8.5 7.3 6.5 6.3 7.8 5.7 4.9 5.3 5.5 6.2 6.1
5.2 4.7 5.6 5.7 9.2 7.0 5.4 8.3 6.2 7.0 7.2 9.8 8.7 6.9 6.5 5.8 6.2 6.8 7.3 6.5 5.6 5.4 6.6 6.9 5.1 6.1
5.3 5.9 5.2 6.5 5.0 5.7 4.9 6.6 6.2 6.5 6.0 4.9 4.7 5.6 5.5 6.6 7.8 4.9 4.8 4.4 4.8 4.8 6.5 5.6 6.3
5.2 6.1 4.7 7.1 7.3 6.3 4.9 4.8 5.0 5.2 6.2 9.7 7.0 5.3 5.5 5.5 4.3 4.7 5.0 5.2 6.8 6.4 5.6
4.9 4.6 8.4 8.5 5.6 5.7 5.8 5.6 4.9 11.7 5.2 5.1 5.9 6.0 5.5
5.6 5.0 5.4 6.0 6.0 6.0 7.0 6.0 5.8 6.5 6.4 6.2 5.4 4.9 5.0 6.5 6.7 5.8
5.7

Figure 7b. AIRCRAFT 1000 - 301 hPa RMS O-B vector (ms-1). DECEMBER 2003
Observations with O-B vector difference greater than 60 ms-1 excluded
Values are printed where greater than 30 obs are present

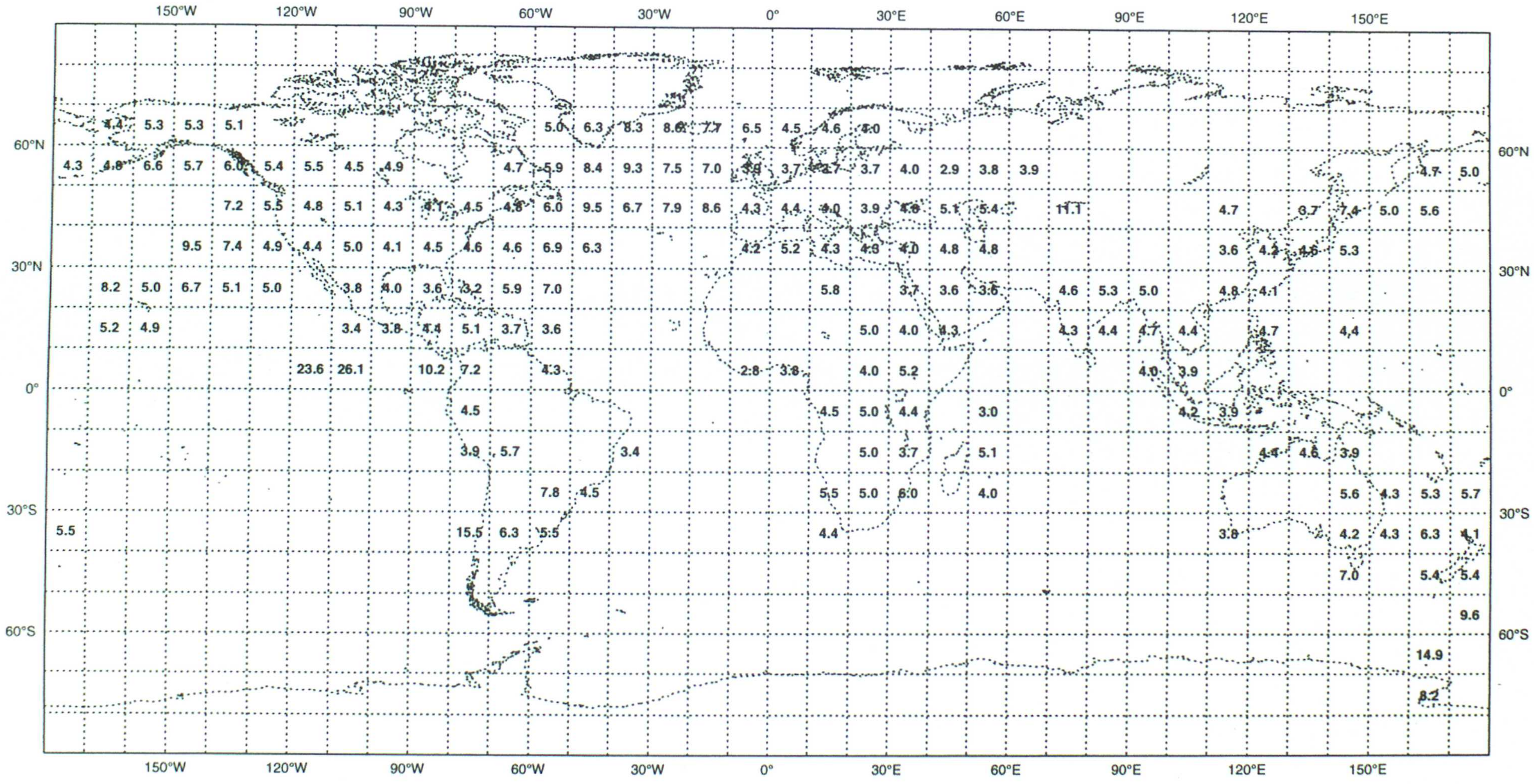

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
4.4 5.3 5.3 5.1 5.0 6.3 8.3 8.6 7.7 6.5 4.5 4.6 4.0
4.3 4.8 6.6 5.7 6.0 5.4 5.5 4.5 4.9 4.7 5.9 8.4 9.3 7.5 7.0 3.8 3.7 2.7 3.7 4.0 2.9 3.8 3.9 4.7 5.0
7.2 5.5 4.8 5.1 4.3 4.1 4.5 4.8 6.0 9.5 6.7 7.9 8.6 4.3 4.4 4.0 3.9 4.6 5.1 5.4 11.1 4.7 3.7 7.4 5.0 5.6
9.5 7.4 4.9 4.4 5.0 4.1 4.5 4.6 4.6 6.9 6.3 4.2 5.2 4.3 4.5 4.0 4.8 4.8 3.6 4.2 4.6 5.3
8.2 5.0 6.7 5.1 5.0 3.8 4.0 3.6 3.2 5.9 7.0 5.8 3.7 3.6 3.6 4.6 5.3 5.0 4.8 4.1
5.2 4.9 3.4 3.8 4.4 5.1 3.7 3.6 5.0 4.0 4.3 4.3 4.4 4.7 4.4 4.7 4.4
23.6 26.1 10.2 7.2 4.3 2.8 3.8 4.0 5.2 4.0 3.9
4.5 4.5 5.0 4.4 3.0 4.2 3.9
3.9 5.7 3.4 5.0 3.7 5.1 4.4 4.6 3.9
7.8 4.5 5.5 5.0 6.0 4.0 5.6 4.3 5.3 5.7
5.5 15.5 6.3 5.5 4.4 3.8 4.2 4.3 6.3 4.1
7.0 5.4 5.4
9.6
14.9
8.2

TABLE 5

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from each unique identifier for radiosonde TEMPs.
Area monitored		:90°N - 90°S, 180°W - 180°E.
Standard of comparison		:Background field from UKMO global model.
Observation times		:00 UTC and 12 UTC.
Level(s) monitored		:Standard levels between 1000.0 - 30.0 hPa
Element monitored		:GEOPOTENTIAL HEIGHT IN metres
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:% REJ	:Percentage of observations rejected by quality control at level shown during period excluding those with gross errors.
	:SD	:SD of difference of observations from background values at level shown excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values at level shown excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values at level shown excluding those with gross errors.
	:NUM LEVELS	:Number of levels satisfying selection criteria.
GROSS ERROR LIMITS	:Defined in Appendix I.1	
SELECTION CRITERIA	: ≥3 levels with ≥10 observations and ≥ 100 m weighted RMS.	

ONLY THE WORST LEVEL IS SHOWN WITH UNWEIGHTED RMS

WMO IDENT	OBS TIME	ELM	LEV	LAT/LONG	NUM OBS	NUM GROSS	SD	BIAS	RMS	NUM LEVELS
20674	00	Z	1000	73/ 80	19	8	28.1	-25.8	38.2	6
20744	00	Z	1000	72/ 53	3	15	26.2	-71.7	76.3	5
34247	00	Z	30	50/ 41	15	0	116.8	208.1	238.7	5
42027	00	Z	200	34/ 75	17	0	82.2	-34.9	89.3	4
42101	00	Z	150	30/ 76	28	0	66.7	-95.8	116.7	6
42182	00	Z	1000	29/ 77	15	9	19.1	-71.7	74.2	8
42182	12	Z	1000	29/ 77	15	12	13.8	-66.3	67.7	10
42314	00	Z	1000	27/ 95	1	25	0.0	-92.0	92.0	5
42314	12	Z	250	27/ 95	11	0	57.4	-94.8	110.8	4
42361	00	Z	1000	26/ 78	22	2	20.3	-69.3	72.2	8
42361	12	Z	1000	26/ 78	22	5	21.5	-73.8	76.9	8
42369	00	Z	250	27/ 81	9	2	53.1	-105.2	117.9	4
42369	12	Z	250	27/ 81	10	0	54.4	-94.2	108.8	5
42379	00	Z	150	27/ 83	16	0	88.6	-78.8	118.5	5
42397	12	Z	250	27/ 88	10	0	63.9	-129.6	144.5	5
42410	00	Z	1000	26/ 92	24	5	12.4	-78.0	79.0	5
42410	12	Z	1000	26/ 92	13	10	11.7	-85.9	86.7	5
42492	00	Z	300	26/ 85	30	0	71.6	-42.3	83.2	8
42492	12	Z	200	26/ 85	19	2	58.1	-128.8	141.3	7
42867	00	Z	200	21/ 79	17	0	43.0	-109.6	117.8	7
42867	12	Z	30	21/ 79	10	1	123.7	216.1	249.0	6
42971	12	Z	70	20/ 86	13	0	137.5	89.8	164.3	4
43003	00	Z	250	19/ 73	23	2	38.6	-134.9	140.3	12
43003	12	Z	1000	19/ 73	20	0	10.5	-45.7	46.9	8
43185	00	Z	200	16/ 81	19	0	83.4	-66.6	106.7	8
43185	12	Z	150	16/ 81	23	0	113.7	-25.8	116.6	6
43192	00	Z	1000	15/ 74	17	7	14.2	-78.8	80.0	4
43192	12	Z	1000	15/ 74	12	11	8.1	-89.0	89.4	4
43295	00	Z	70	13/ 78	9	1	174.1	56.1	182.9	9
43295	12	Z	200	13/ 78	11	0	69.6	98.4	120.5	8
43311	00	Z	200	11/ 73	14	0	82.3	-81.6	115.9	6
43333	00	Z	30	12/ 93	16	0	110.4	202.8	230.9	7
43333	12	Z	200	12/ 93	23	0	78.9	-51.5	94.2	5
43346	00	Z	100	11/ 80	10	0	132.1	45.0	139.5	5
43346	12	Z	150	11/ 80	16	0	126.8	49.0	135.9	8
43371	00	Z	70	8/ 77	18	0	139.6	-95.6	169.2	10
43371	12	Z	50	8/ 77	10	1	120.0	178.4	215.0	5
72376	12	Z	400	37/-108	29	0	54.8	23.9	59.8	4
78866	12	Z	30	18/ -63	18	0	87.2	198.9	217.2	7
89592	00	Z	50	-67/ 93	30	0	89.2	166.6	189.0	5
91366	00	Z	30	9/ 168	22	0	129.4	140.1	190.7	4
97180	00	Z	100	-5/ 120	11	2	152.5	-2.3	152.5	9

Figure 8. TEMP 500 hPa geopotential mean daily count. DECEMBER 2003
All hours
Global average number of observations in 24 hours = 1130

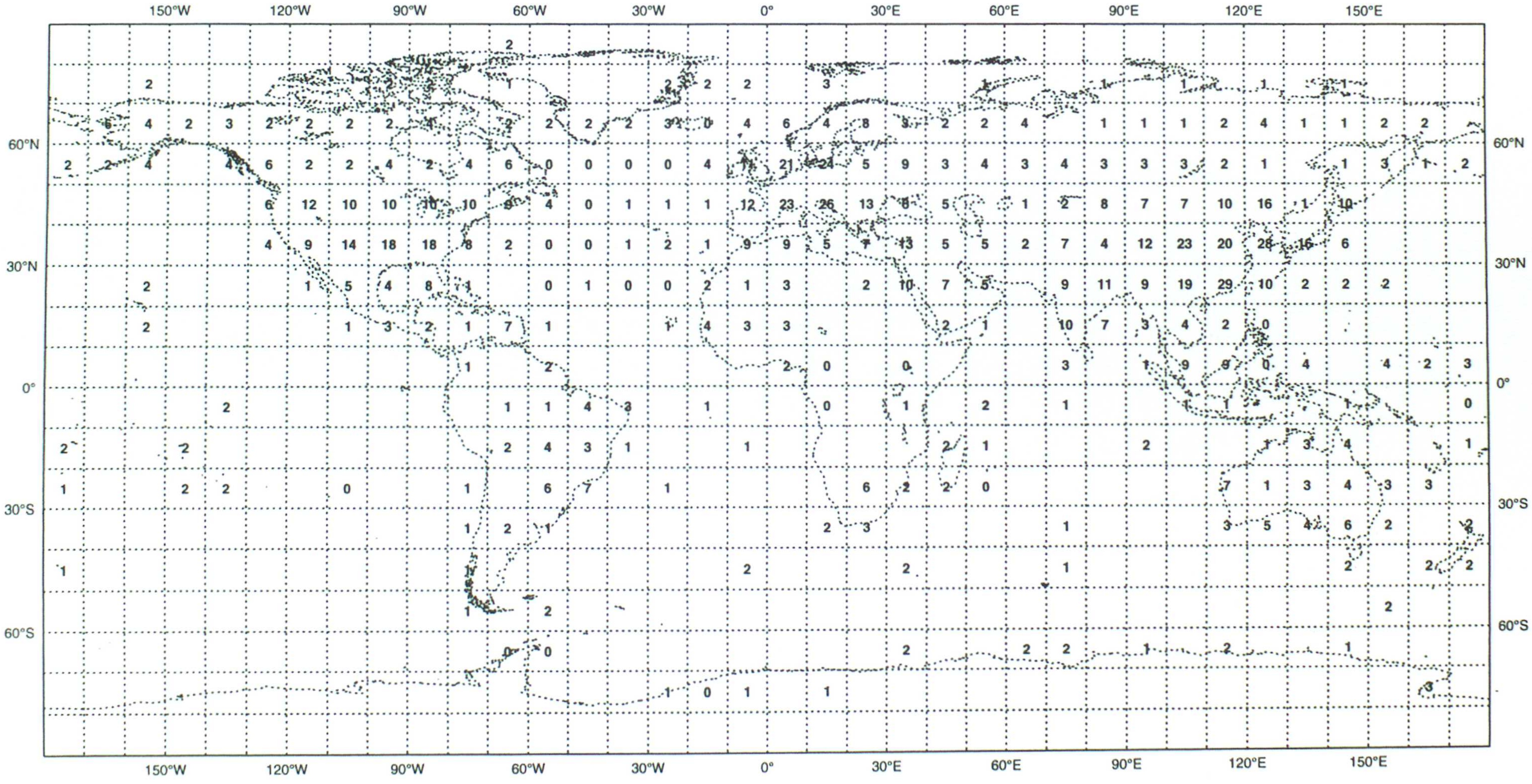

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

TABLE 6

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from each unique identifier for radiosonde TEMPs.
Area monitored		:90°N - 90°S, 180°W - 180°E.
Standard of comparison		:Background field from UKMO global model.
Observation times		:00 UTC and 12 UTC.
Level(s) monitored		:Standard levels between 1000.0 - 100.0 hPa
Element monitored		:VECTOR WIND in m s^{-1}
Parameters monitored		
	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:% REJ	:Percentage of observations rejected by quality control at level shown during period excluding those with gross errors.
	:UBIAS,VBIAS	:Mean difference of observations of U and V components from background values at level shown excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values at level shown excluding those with gross errors.
	:NUM LEVELS	:Number of levels satisfying selection criteria.
GROSS ERROR LIMITS	:Defined in Appendix I.2	
SELECTION CRITERIA	: ≥ 10 observations and ≥ 15 m s^{-1} RMS vector wind.	

ONLY THE STANDARD LEVEL BETWEEN 1000 - 100 hPa WITH HIGHEST RMS IS SHOWN

WMO IDENT	OBS TIME	ELM	LEV	LAT/LONG	NUM OBS	NUM GROSS	% REJ	UBIAS	VBIAS	RMS	LEVELS
FQFM	00	V	1000	19/ -57	10	0	90	-0.8	-5.6	16.0	1
ZCBP6	12	V	300	58/ -10	9	0	11	-2.0	5.2	16.5	1
16754	00	V	250	35/ 25	16	0	6	-0.4	7.0	31.3	1
40809	12	V	400	33/ 59	14	0	100	-9.9	4.0	18.5	1
42182	00	V	250	29/ 77	13	0	92	-16.9	-1.8	23.7	3
42182	12	V	300	29/ 77	17	0	82	-5.3	-9.2	24.7	4
42361	00	V	300	26/ 78	10	0	30	5.3	0.2	25.3	1
42369	00	V	500	27/ 81	18	0	100	-0.1	-1.5	21.8	2
42379	00	V	200	27/ 83	12	0	100	-6.8	-16.8	26.5	3
42410	12	V	250	26/ 92	10	0	100	7.6	3.0	19.3	2
42971	00	V	150	20/ 86	10	0	10	-5.6	-6.1	16.1	1
47058	00	V	300	39/ 126	10	0	100	-6.9	-1.4	18.8	1
48407	12	V	150	15/ 105	25	0	28	-5.0	-10.7	15.7	1
48568	12	V	150	7/ 101	26	0	100	5.4	-7.8	17.3	1
48601	00	V	100	5/ 100	30	0	100	6.1	-2.5	15.6	1
48650	00	V	100	3/ 102	30	0	20	9.7	-0.7	18.0	1
48650	12	V	100	3/ 102	26	0	15	6.7	-0.1	16.0	1
48698	00	V	100	1/ 104	30	0	30	13.8	0.5	22.4	1
48698	12	V	100	1/ 104	23	0	26	11.2	0.9	18.5	1
58238	12	V	150	32/ 119	28	0	3	-2.1	1.6	15.4	1
60360	12	V	150	37/ 8	10	1	100	6.2	-0.1	24.1	3
60559	12	V	300	33/ 7	11	0	100	-11.4	7.1	18.8	1
60620	12	V	250	28/ 0	12	0	100	-25.2	-1.3	28.8	3
62337	00	V	250	31/ 34	29	0	100	-8.5	11.6	17.7	4
62337	12	V	200	31/ 34	26	0	100	-8.6	12.8	19.2	3
62378	00	V	200	30/ 31	28	0	100	-17.9	-5.7	21.6	4
62378	12	V	200	30/ 31	28	0	100	-18.7	-6.6	23.1	4
62403	00	V	100	26/ 33	24	1	12	1.4	-1.2	15.5	1
62403	12	V	100	26/ 33	26	2	11	-2.3	0.8	21.0	2
62414	00	V	150	24/ 33	25	0	4	-5.3	1.8	28.0	1
62414	12	V	150	24/ 33	18	0	5	-9.1	4.0	31.7	1
64700	00	V	300	12/ 15	13	0	7	-2.9	0.0	15.2	1
68263	12	V	300	-26/ 28	10	0	30	-4.4	-5.8	19.2	1
68442	12	V	300	-29/ 26	15	0	100	-8.0	-1.5	23.8	2
68461	12	V	150	-28/ 28	10	0	100	11.8	-5.5	18.2	2
68512	12	V	300	-30/ 18	21	0	100	-7.5	-1.8	16.8	2
72376	00	V	300	37/-108	27	0	100	-1.5	1.2	16.1	2
96035	00	V	100	4/ 99	10	0	100	4.3	-1.4	15.7	1
96413	00	V	100	1/ 110	30	0	16	11.9	-0.7	18.7	1
96413	12	V	100	1/ 110	28	0	7	7.8	1.1	15.7	1
96749	00	V	100	-6/ 107	15	0	100	11.0	0.1	17.5	1

Figure 9. TEMP/PILOT 300 hPa wind mean daily count. DECEMBER 2003
All hours
Global average number of observations in 24 hours = 1273

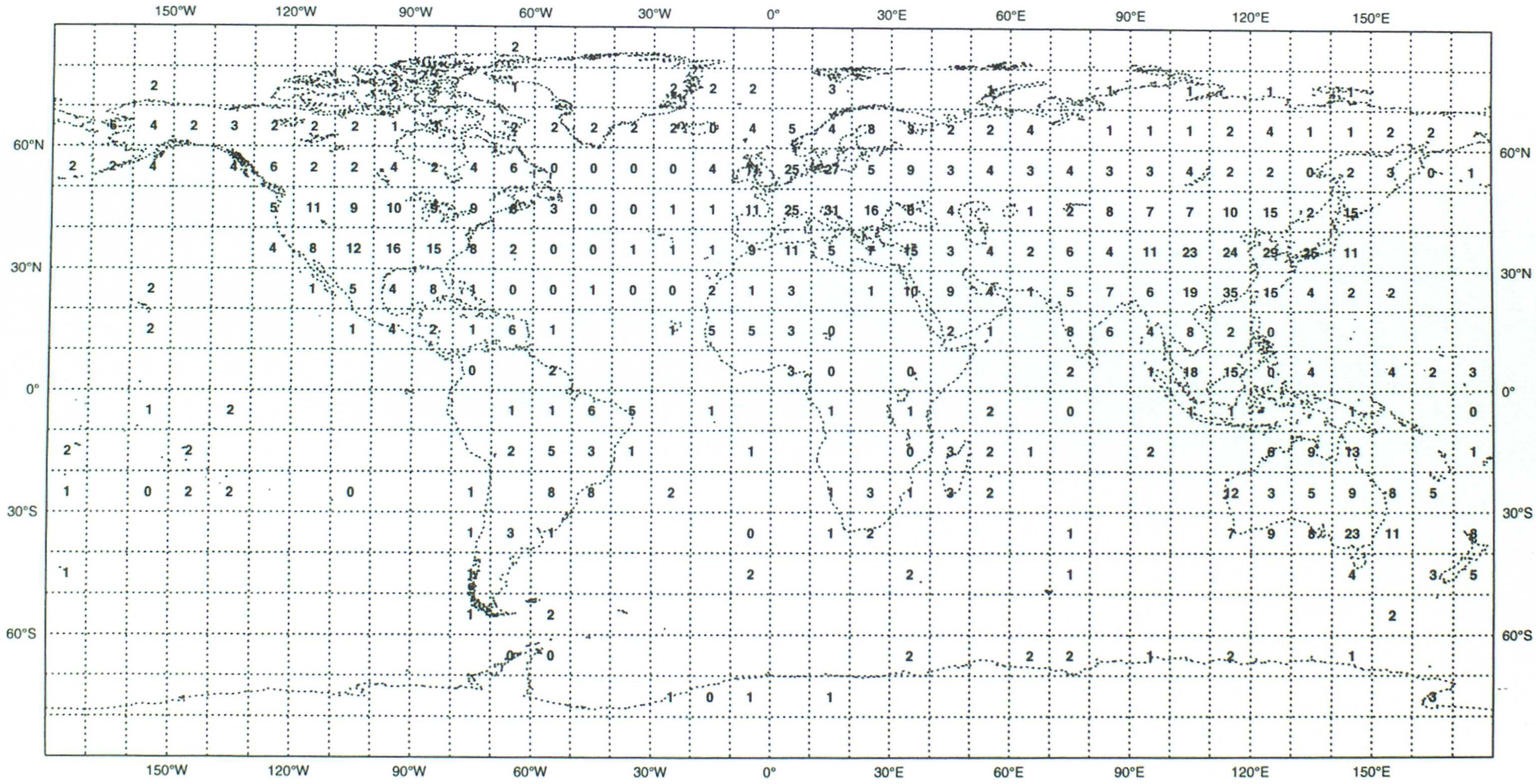

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
2
2 1 2 2 2 3 1 1 1 1 1
6 4 2 3 2 2 2 1 2 2 2 2 2 0 4 5 4 8 3 2 2 4 1 1 1 2 4 1 1 2 2
2 2 4 4 6 2 2 4 2 4 6 0 0 0 0 4 11 25 27 5 9 3 4 3 4 3 3 4 2 2 0 2 3 0 1
5 11 9 10 5 9 8 3 0 0 1 1 11 25 31 16 8 4 1 1 2 8 7 7 10 15 2 15
4 8 12 16 15 8 2 0 0 1 1 1 9 11 5 7 15 3 4 2 6 4 11 23 24 29 26 11
2 1 5 4 8 1 0 0 1 0 0 2 1 3 1 10 9 4 1 5 7 6 19 35 15 4 2 2
2 1 4 2 1 6 1 1 5 5 3 0 2 1 8 6 4 8 2 0
0 2 3 0 0 2 1 18 15 0 4 4 2 3
1 2 1 1 6 5 1 1 1 2 0 0
2 2 2 5 3 1 1 0 3 2 1 2 6 9 13 1
1 0 2 2 0 1 8 8 2 1 3 1 3 2 12 3 5 9 8 5
1 3 1 0 1 2 1 7 9 8 23 11 8
1 1 2 2 1 4 3 5
1 2 2
0 0 2 2 2 1 2 1
1 0 1 1 3

TABLE 7

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from each unique identifier for radiosonde TEMPs.

Area monitored :90°N - 90°S, 180°W - 180°E.

Standard of comparison :Background field from UKMO global model.

Observation times :00 UTC and 12 UTC.

Level(s) monitored :Standard levels between 500.0 - 150.0 hPa

Element monitored :WIND DIRECTION in degrees

Parameters monitored

:NUM OBS :Average number of observations at all levels.

:BIAS :Mean difference of observations from background values from all levels.

:MAX SPREAD :(For observation - background values) Maximum absolute difference of SD at any level from SD at all levels

:SD :SD of difference of observations from background values at all levels.

SELECTION CRITERIA :NUM OBS ≥ 5, and
ABSOLUTE BIAS $\geq 10°$, with
SD $< 30°$, and
MAX SPREAD $< 10°$

WMO IDENT	OBS TIME	ELM	LAT/LONG	NUM OBS	BIAS	MAX SPREAD	SD
08594	12	DD	17/ -23	22	-10.3	4.8	9.8
33791	12	DD	48/ 33	24	-10.5	5.2	10.6
42182	00	DD	29/ 77	13	10.7	2.9	18.1
42379	12	DD	27/ 83	7	14.5	9.6	12.1
48455	00	DD	14/ 101	17	-10.1	8.5	23.6
62337	00	DD	31/ 34	27	-19.6	2.8	5.4
62337	12	DD	31/ 34	26	-20.3	2.8	5.7
78954	12	DD	13/ -59	21	-16.4	5.5	17.4
82193	00	DD	-1/ -48	16	-12.3	9.9	22.5

MONITORING OF SATELLITE WINDS

MONITORING CENTRE: EXETER

MONTH: Dec 2003

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from GOES-8, GOES-10, METEOSAT-5, METEOSAT-7, GMS-5, INSAT.

Standard of comparison :Background field from UKMO global model.

Selection Criteria :number of observations > 10.

Data Extracted :Layer 701 - 1000 hPa
401 - 700 hPa
101 - 400 hPa

:Mean wind

:Mean observation minus background vector wind differences

:Mean observation minus background speed differences

:RMS of observation minus background vector differences

Figure 10. SATOB 701 - 1000 hPa mean daily count. DECEMBER 2003
Global average number of observations in 24 hours = 92310

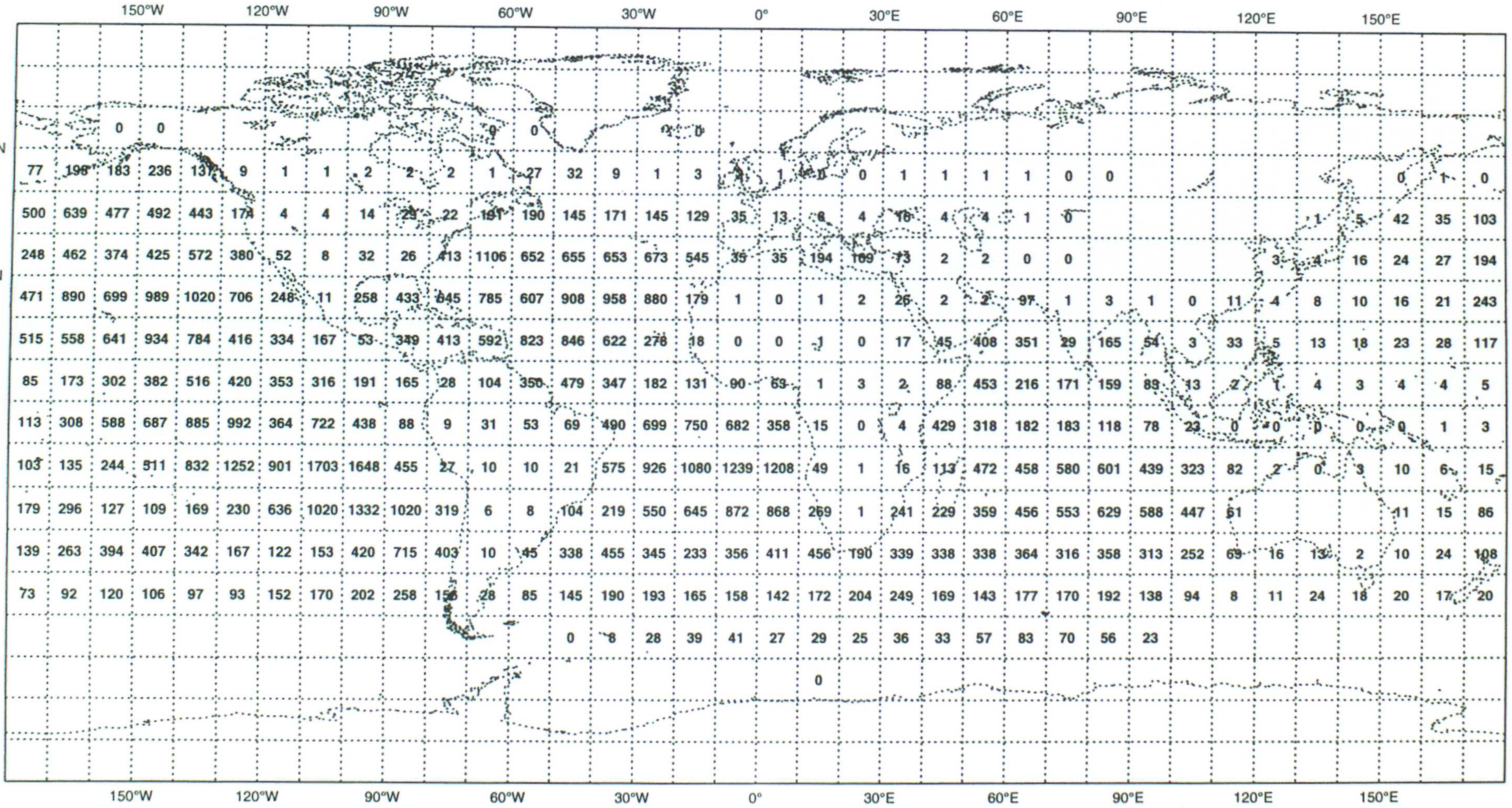

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
0 0 0 0 0
77 198 183 236 137 9 1 1 2 2 2 1 27 32 9 1 3 1 0 0 1 1 1 1 0 0 0 1 0
500 639 477 492 443 174 4 4 14 29 22 191 190 145 171 145 129 35 13 6 4 16 4 4 1 0 1 5 42 35 103
248 462 374 425 572 380 52 8 32 26 413 1106 652 655 653 673 545 35 35 194 169 73 2 2 0 0 3 4 16 24 27 194
471 890 699 989 1020 706 246 11 258 433 645 785 607 908 958 880 179 1 0 1 2 26 2 2 97 1 3 1 0 11 4 8 10 16 21 243
515 558 641 934 784 416 334 167 53 349 413 592 823 846 622 278 18 0 0 1 0 17 45 408 351 29 165 54 3 33 5 13 18 23 28 117
85 173 302 382 516 420 353 316 191 165 28 104 350 479 347 182 131 90 63 1 3 2 88 453 216 171 159 89 13 2 1 4 3 4 4 5
113 308 588 687 885 992 364 722 438 88 9 31 53 69 490 699 750 682 358 15 0 4 429 318 182 183 118 78 23 0 0 0 0 0 1 3
103 135 244 511 832 1252 901 1703 1648 455 27 10 10 21 575 926 1080 1239 1208 49 1 16 113 472 458 580 601 439 323 82 2 0 3 10 6 15
179 296 127 109 169 230 636 1020 1332 1020 319 6 8 104 219 550 645 872 868 269 1 241 229 359 456 553 629 588 447 61 11 15 86
139 263 394 407 342 167 122 153 420 715 403 10 45 338 455 345 233 356 411 456 190 339 338 338 364 316 358 313 252 69 16 13 2 10 24 108
73 92 120 106 97 93 152 170 202 258 156 28 85 145 190 193 165 158 142 172 204 249 169 143 177 170 192 138 94 8 11 24 18 20 17 20
0 8 28 39 41 27 29 25 36 33 57 83 70 56 23
0

Figure 11. SATOB 701 - 1000 hPa vector mean wind. DECEMBER 2003
All observations
Arrows are plotted where greater than 10 obs are present

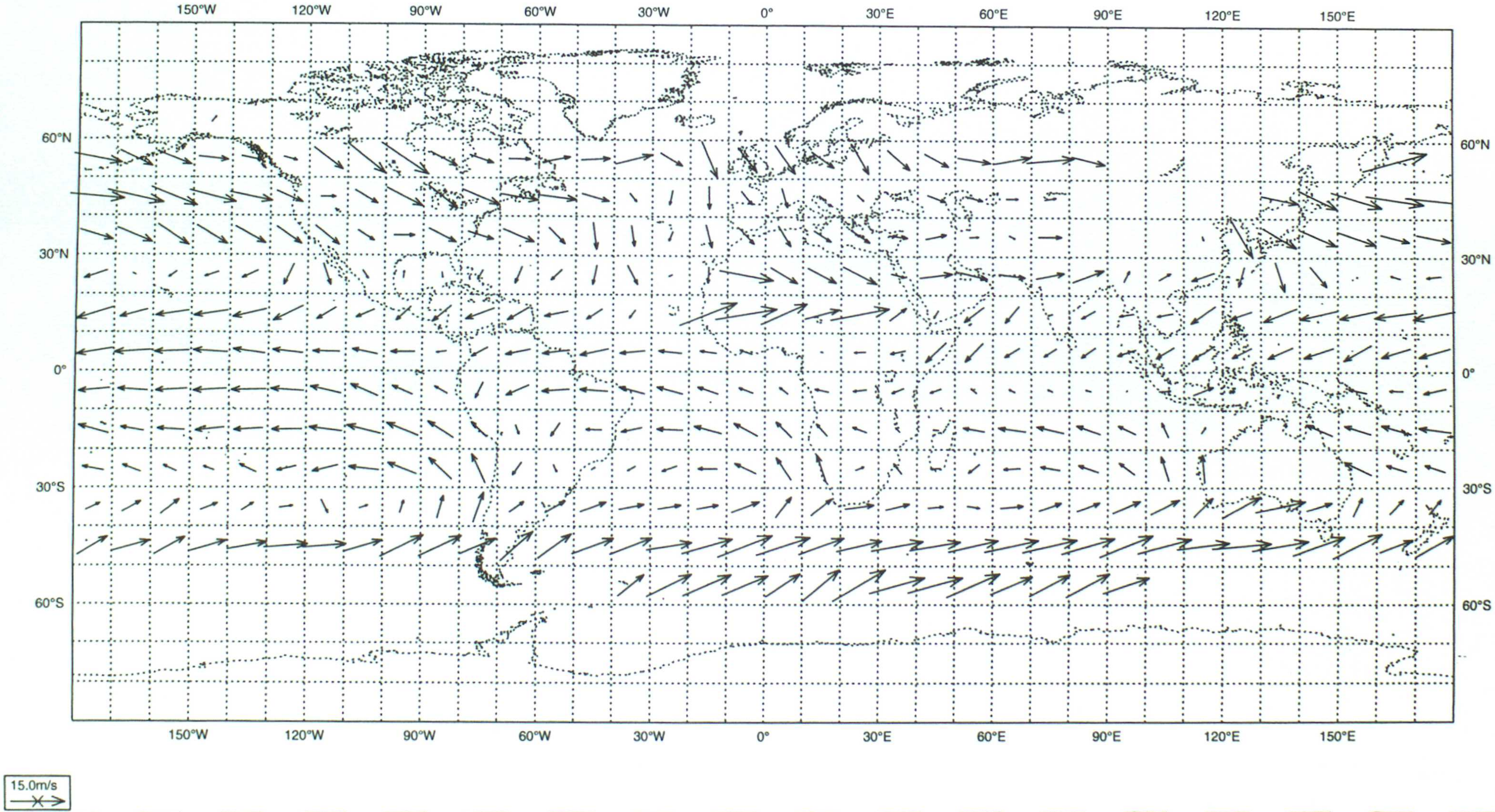

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
15.0m/s

Figure 12. SATOB 701 - 1000 hPa mean vector wind differences. DECEMBER 2003
All observations
Arrows are plotted where greater than 10 obs are present

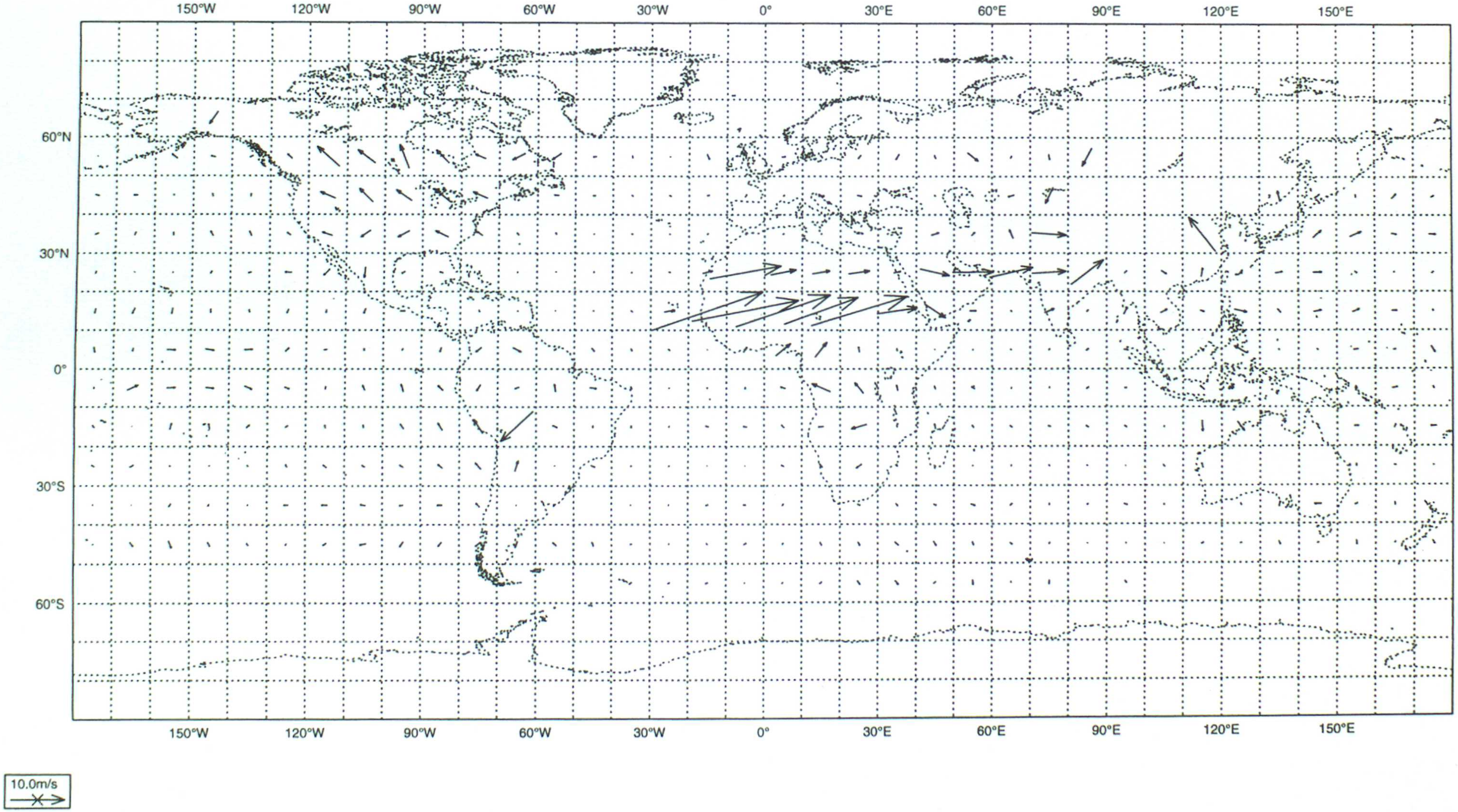

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
10.0m/s

Figure 13. SATOB 701 - 1000 hPa mean O-B speed differences (ms-1). DECEMBER 2003
All observations
Values are plotted where greater than 10 obs are present

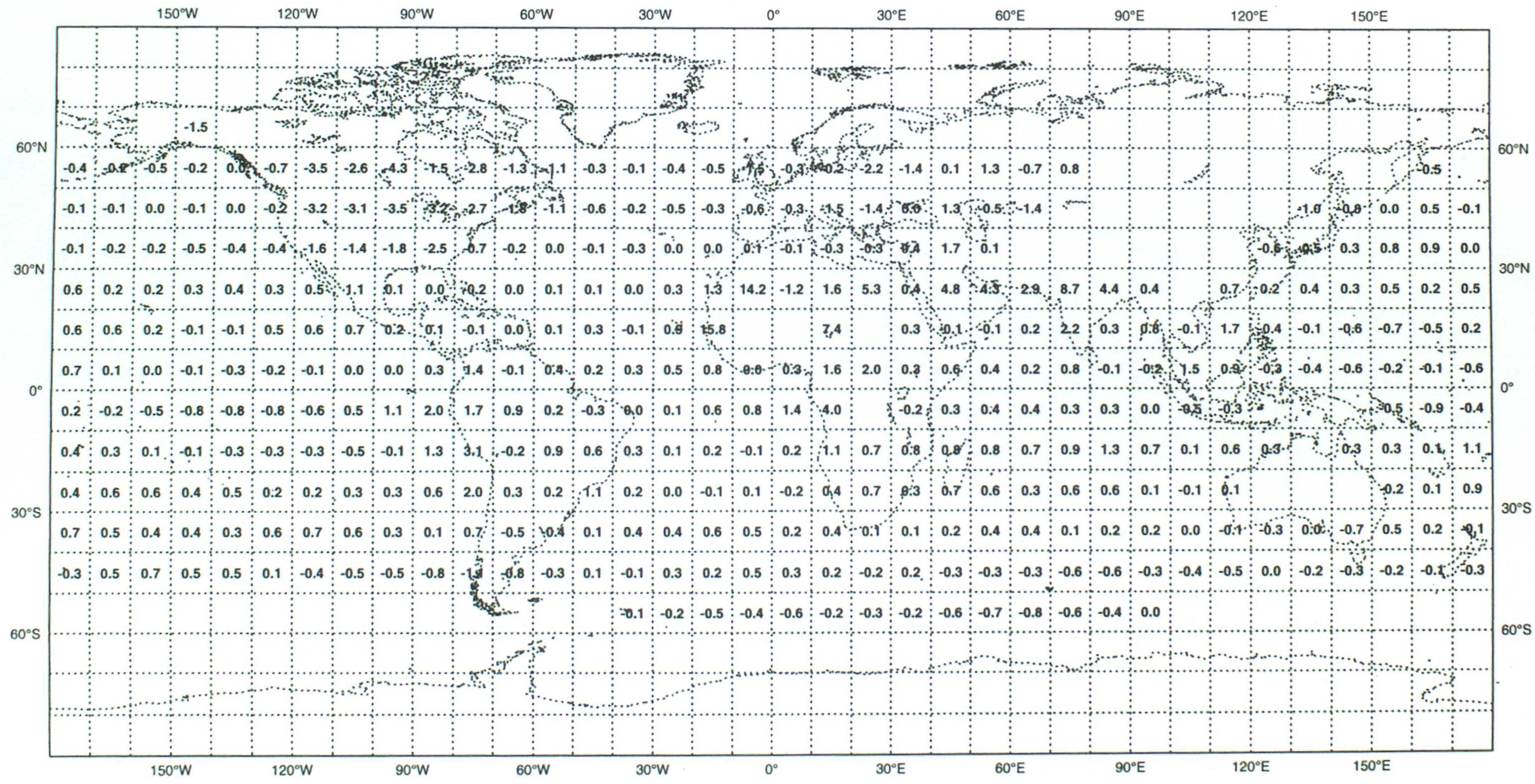

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
-1.5
-0.4 -0.2 -0.5 -0.2 0.0 -0.7 -3.5 -2.6 -4.3 -1.5 -2.8 -1.3 -1.1 -0.3 -0.1 -0.4 -0.5 1.5 -0.3 -0.2 -2.2 -1.4 0.1 1.3 -0.7 0.8 -0.5
-0.1 -0.1 0.0 -0.1 0.0 -0.2 -3.2 -3.1 -3.5 -3.2 -2.7 -1.8 -1.1 -0.6 -0.2 -0.5 -0.3 -0.6 -0.3 -1.5 -1.4 0.0 1.3 -0.5 -1.4 -1.0 -0.8 0.0 0.5 -0.1
-0.1 -0.2 -0.2 -0.5 -0.4 -0.4 -1.6 -1.4 -1.8 -2.5 -0.7 -0.2 0.0 -0.1 -0.3 0.0 0.0 0.1 -0.1 -0.3 -0.3 8.4 1.7 0.1 -0.6 -0.5 0.3 0.8 0.9 0.0
0.6 0.2 0.2 0.3 0.4 0.3 0.5 1.1 0.1 0.0 -0.2 0.0 0.1 0.1 0.0 0.3 1.3 14.2 -1.2 1.6 5.3 0.4 4.8 4.3 2.9 8.7 4.4 0.4 0.7 0.2 0.4 0.3 0.5 0.2 0.5
0.6 0.6 0.2 -0.1 -0.1 0.5 0.6 0.7 0.2 0.1 -0.1 0.0 0.1 0.3 -0.1 0.8 15.8 7.4 0.3 -0.1 -0.1 0.2 2.2 0.3 0.6 -0.1 1.7 -0.4 -0.1 -0.6 -0.7 -0.5 0.2
0.7 0.1 0.0 -0.1 -0.3 -0.2 -0.1 0.0 0.0 0.3 1.4 -0.1 0.4 0.2 0.3 0.5 0.8 8.0 0.3 1.6 2.0 0.3 0.6 0.4 0.2 0.8 -0.1 -0.2 1.5 0.9 -0.3 -0.4 -0.6 -0.2 -0.1 -0.6
0.2 -0.2 -0.5 -0.8 -0.8 -0.8 -0.6 0.5 1.1 2.0 1.7 0.9 0.2 -0.3 0.0 0.1 0.6 0.8 1.4 4.0 -0.2 0.3 0.4 0.4 0.3 0.3 0.0 -0.5 -0.3 -0.5 -0.9 -0.4
0.4 0.3 0.1 -0.1 -0.3 -0.3 -0.3 -0.5 -0.1 1.3 3.1 -0.2 0.9 0.6 0.3 0.1 0.2 -0.1 0.2 1.1 0.7 0.8 0.8 0.8 0.7 0.9 1.3 0.7 0.1 0.6 0.3 0.3 0.3 0.1 1.1
0.4 0.6 0.6 0.4 0.5 0.2 0.2 0.3 0.3 0.6 2.0 0.3 0.2 1.1 0.2 0.0 -0.1 0.1 -0.2 0.4 0.7 0.3 0.7 0.6 0.3 0.6 0.6 0.1 -0.1 0.1 -0.2 0.1 0.9
0.7 0.5 0.4 0.4 0.3 0.6 0.7 0.6 0.3 0.1 0.7 -0.5 0.4 0.1 0.4 0.4 0.6 0.5 0.2 0.4 0.1 0.1 0.2 0.4 0.4 0.1 0.2 0.2 0.0 -0.1 -0.3 0.0 -0.7 0.5 0.2 -0.1
-0.3 0.5 0.7 0.5 0.5 0.1 -0.4 -0.5 -0.5 -0.8 -1.3 -0.8 -0.3 0.1 -0.1 0.3 0.2 0.5 0.3 0.2 -0.2 0.2 -0.3 -0.3 -0.3 -0.6 -0.6 -0.3 -0.4 -0.5 0.0 -0.2 -0.3 -0.2 -0.1 -0.3
-0.1 -0.2 -0.5 -0.4 -0.6 -0.2 -0.3 -0.2 -0.6 -0.7 -0.8 -0.6 -0.4 0.0

Figure 14. SATOB 701 - 1000 hPa mean RMS O-B vector differences (ms-1). DECEMBER 2003
All observations
Values are plotted where greater than 10 obs are present

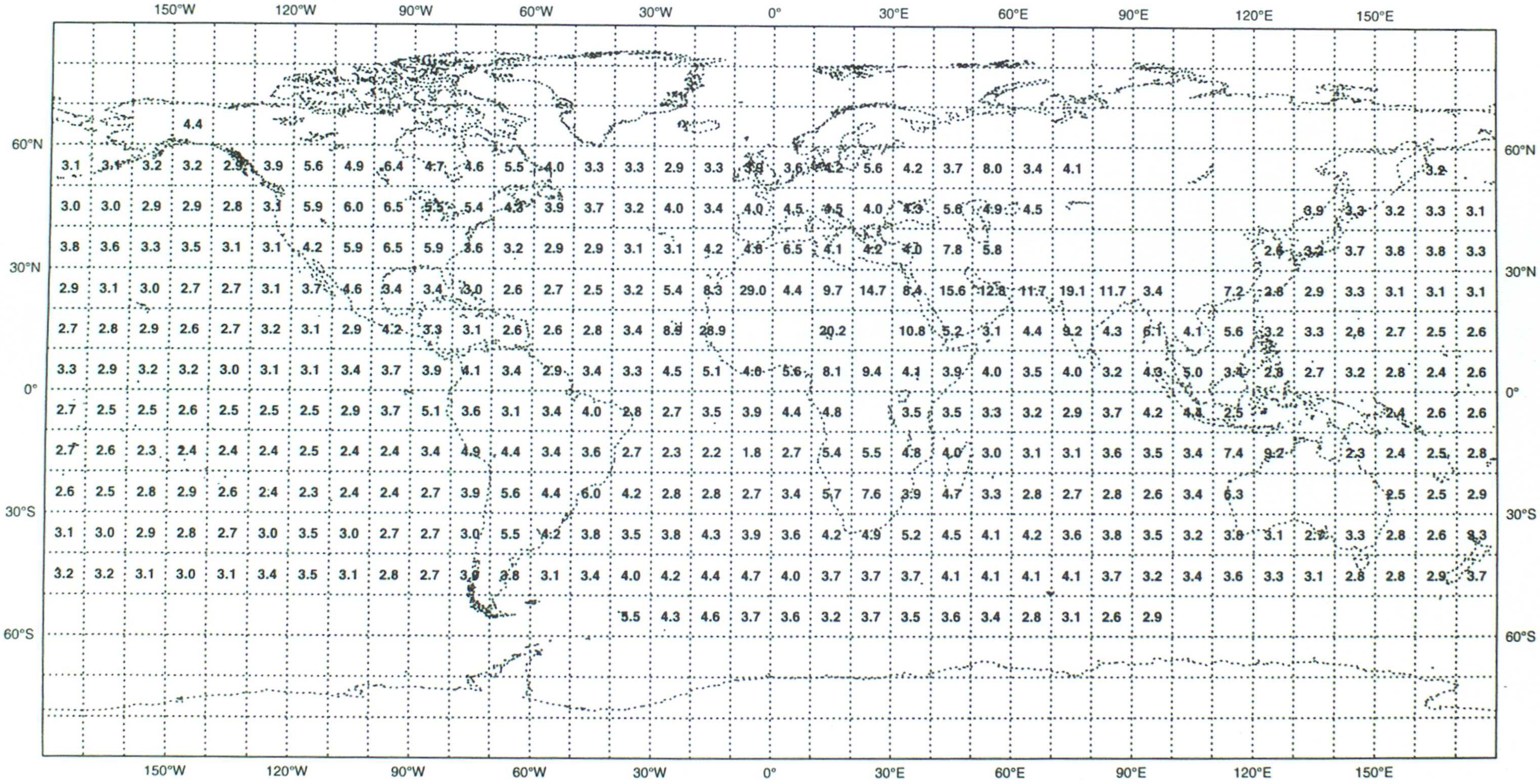

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
4.4
3.1 3.1 3.2 3.2 2.9 3.9 5.6 4.9 6.4 4.7 4.6 5.5 4.0 3.3 3.3 2.9 3.3 3.9 3.6 4.2 5.6 4.2 3.7 8.0 3.4 4.1 3.2
3.0 3.0 2.9 2.9 2.8 3.1 5.9 6.0 6.5 5.5 5.4 4.3 3.9 3.7 3.2 4.0 3.4 4.0 4.5 4.5 4.0 4.3 5.6 4.9 4.5 3.9 3.3 3.2 3.3 3.1
3.8 3.6 3.3 3.5 3.1 3.1 4.2 5.9 6.5 5.9 3.6 3.2 2.9 2.9 3.1 3.1 4.2 4.6 6.5 4.1 4.2 4.0 7.8 5.8 2.6 3.2 3.7 3.8 3.8 3.3
2.9 3.1 3.0 2.7 2.7 3.1 3.7 4.6 3.4 3.4 3.0 2.6 2.7 2.5 3.2 5.4 8.3 29.0 4.4 9.7 14.7 8.4 15.6 12.8 11.7 19.1 11.7 3.4 7.2 2.8 2.9 3.3 3.1 3.1 3.1
2.7 2.8 2.9 2.6 2.7 3.2 3.1 2.9 4.2 3.3 3.1 2.6 2.6 2.8 3.4 8.9 28.9 20.2 10.8 5.2 3.1 4.4 9.2 4.3 6.1 4.1 5.6 3.2 3.3 2.8 2.7 2.5 2.6
3.3 2.9 3.2 3.2 3.0 3.1 3.1 3.4 3.7 3.9 4.1 3.4 2.9 3.4 3.3 4.5 5.1 4.0 5.6 8.1 9.4 4.1 3.9 4.0 3.5 4.0 3.2 4.3 5.0 3.4 2.8 2.7 3.2 2.8 2.4 2.6
2.7 2.5 2.5 2.6 2.5 2.5 2.5 2.9 3.7 5.1 3.6 3.1 3.4 4.0 2.8 2.7 3.5 3.9 4.4 4.8 3.5 3.5 3.3 3.2 2.9 3.7 4.2 4.8 2.5 2.4 2.6 2.6
2.7 2.6 2.3 2.4 2.4 2.4 2.5 2.4 2.4 3.4 4.9 4.4 3.4 3.6 2.7 2.3 2.2 1.8 2.7 5.4 5.5 4.8 4.0 3.0 3.1 3.1 3.6 3.5 3.4 7.4 9.2 2.3 2.4 2.5 2.8
2.6 2.5 2.8 2.9 2.6 2.4 2.3 2.4 2.4 2.7 3.9 5.6 4.4 6.0 4.2 2.8 2.8 2.7 3.4 5.7 7.6 3.9 4.7 3.3 2.8 2.7 2.8 2.6 3.4 6.3 2.5 2.5 2.9
3.1 3.0 2.9 2.8 2.7 3.0 3.5 3.0 2.7 2.7 3.0 5.5 4.2 3.8 3.5 3.8 4.3 3.9 3.6 4.2 4.9 5.2 4.5 4.1 4.2 3.6 3.8 3.5 3.2 3.8 3.1 2.7 3.3 2.8 2.6 3.3
3.2 3.2 3.1 3.0 3.1 3.4 3.5 3.1 2.8 2.7 3.9 3.8 3.1 3.4 4.0 4.2 4.4 4.7 4.0 3.7 3.7 3.7 4.1 4.1 4.1 4.1 3.7 3.2 3.4 3.6 3.3 3.1 2.8 2.8 2.9 3.7
3.5 4.3 4.6 3.7 3.6 3.2 3.7 3.5 3.6 3.4 2.8 3.1 2.6 2.9
150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S

Figure 15. SATOB 401 - 700 hPa mean daily count. DECEMBER 2003
Global average number of observations in 24 hours = 18025

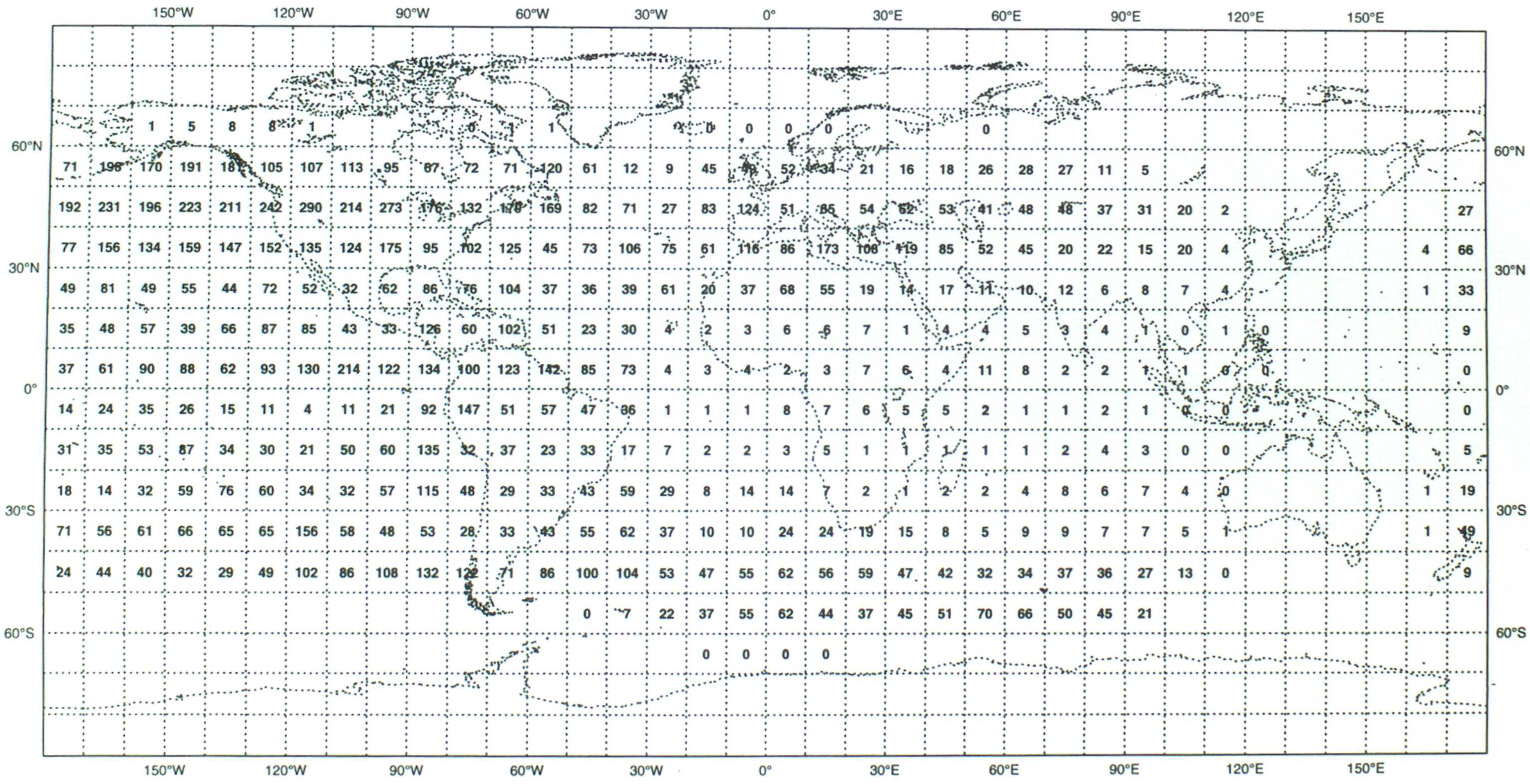

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
1 5 8 8 1 0 1 1 0 0 0 0 0 0
71 198 170 191 181 105 107 113 95 87 72 71 120 61 12 9 45 46 52 134 21 16 18 26 28 27 11 5
192 231 196 223 211 242 290 214 273 176 132 178 169 82 71 27 83 124 51 85 54 62 53 41 48 48 37 31 20 2 27
77 156 134 159 147 152 135 124 175 95 102 125 45 73 106 75 61 116 86 173 108 119 85 52 45 20 22 15 20 4 4 66
49 81 49 55 44 72 52 32 62 86 176 104 37 36 39 61 20 37 68 55 19 14 17 11 10 12 6 8 7 4 1 33
35 48 57 39 66 87 85 43 33 126 60 102 51 23 30 4 2 3 6 6 7 1 4 4 5 3 4 1 0 1 0 9
37 61 90 88 62 93 130 214 122 134 100 123 142 85 73 4 3 4 2 3 7 6 4 11 8 2 2 1 1 0 0 0
14 24 35 26 15 11 4 11 21 92 147 51 57 47 86 1 1 1 8 7 6 5 5 2 1 1 2 1 0 0 0
31 35 53 87 34 30 21 50 60 135 32 37 23 33 17 7 2 2 3 5 1 1 1 1 1 2 4 3 0 0 5
18 14 32 59 76 60 34 32 57 115 48 29 33 43 59 29 8 14 14 7 2 1 2 2 4 8 6 7 4 0 1 19
71 56 61 66 65 65 156 58 48 53 28 33 43 55 62 37 10 10 24 24 19 15 8 5 9 9 7 7 5 1 1 49
24 44 40 32 29 49 102 86 108 132 122 71 86 100 104 53 47 55 62 56 59 47 42 32 34 37 36 27 13 0 9
0 7 22 37 55 62 44 37 45 51 70 66 50 45 21
0 0 0 0

Figure 16. SATOB 401 - 700 hPa vector mean wind. DECEMBER 2003
All observations
Arrows are plotted where greater than 10 obs are present

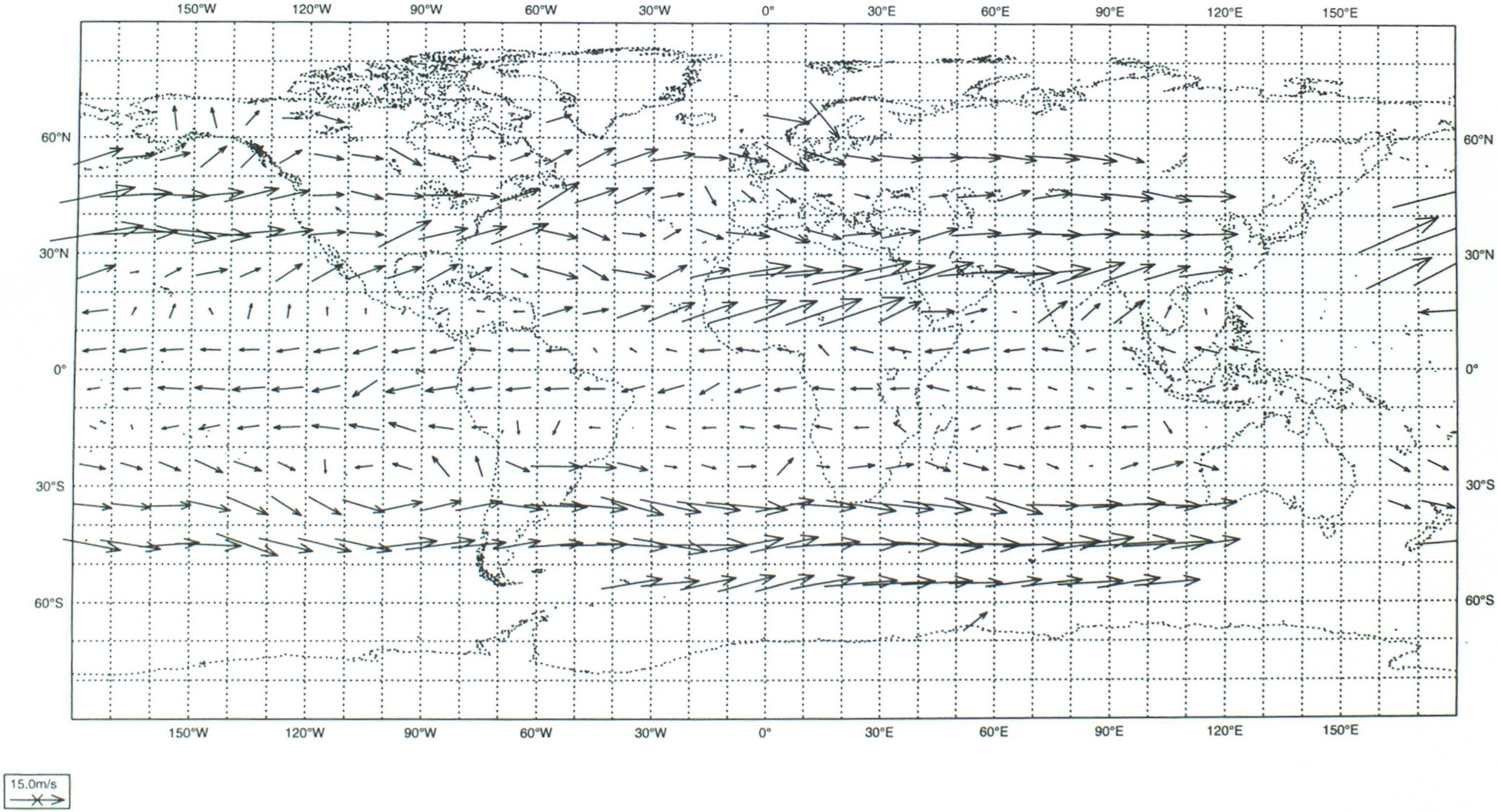

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
15.0m/s

Figure 17. SATOB 401 - 700 hPa mean vector wind differences. DECEMBER 2003
All observations
Arrows are plotted where greater than 10 obs are present

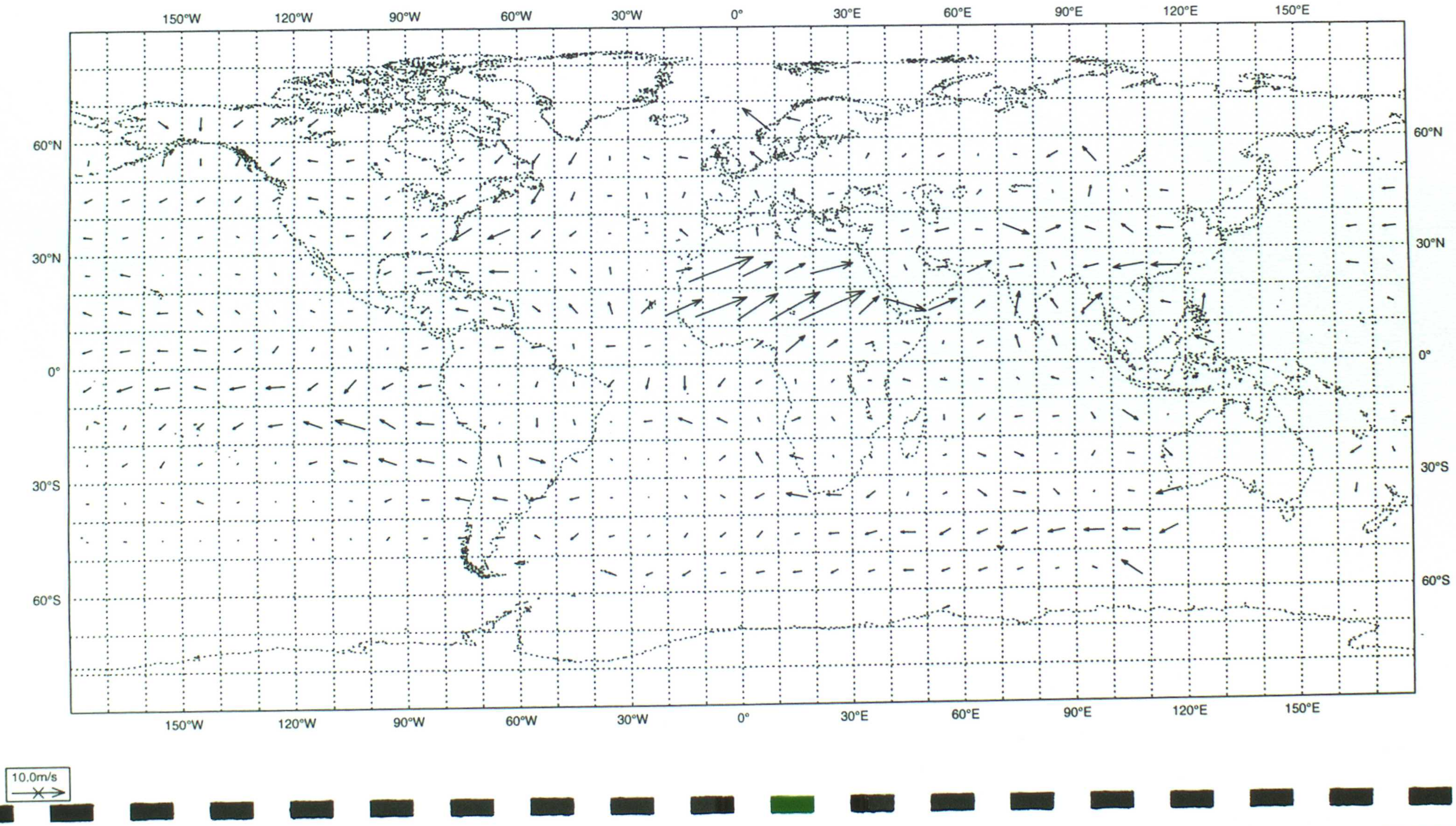

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
10.0m/s

Figure 18. SATOB 401 - 700 hPa mean O-B speed differences (ms-1). DECEMBER 2003
All observations
Values are plotted where greater than 10 obs are present

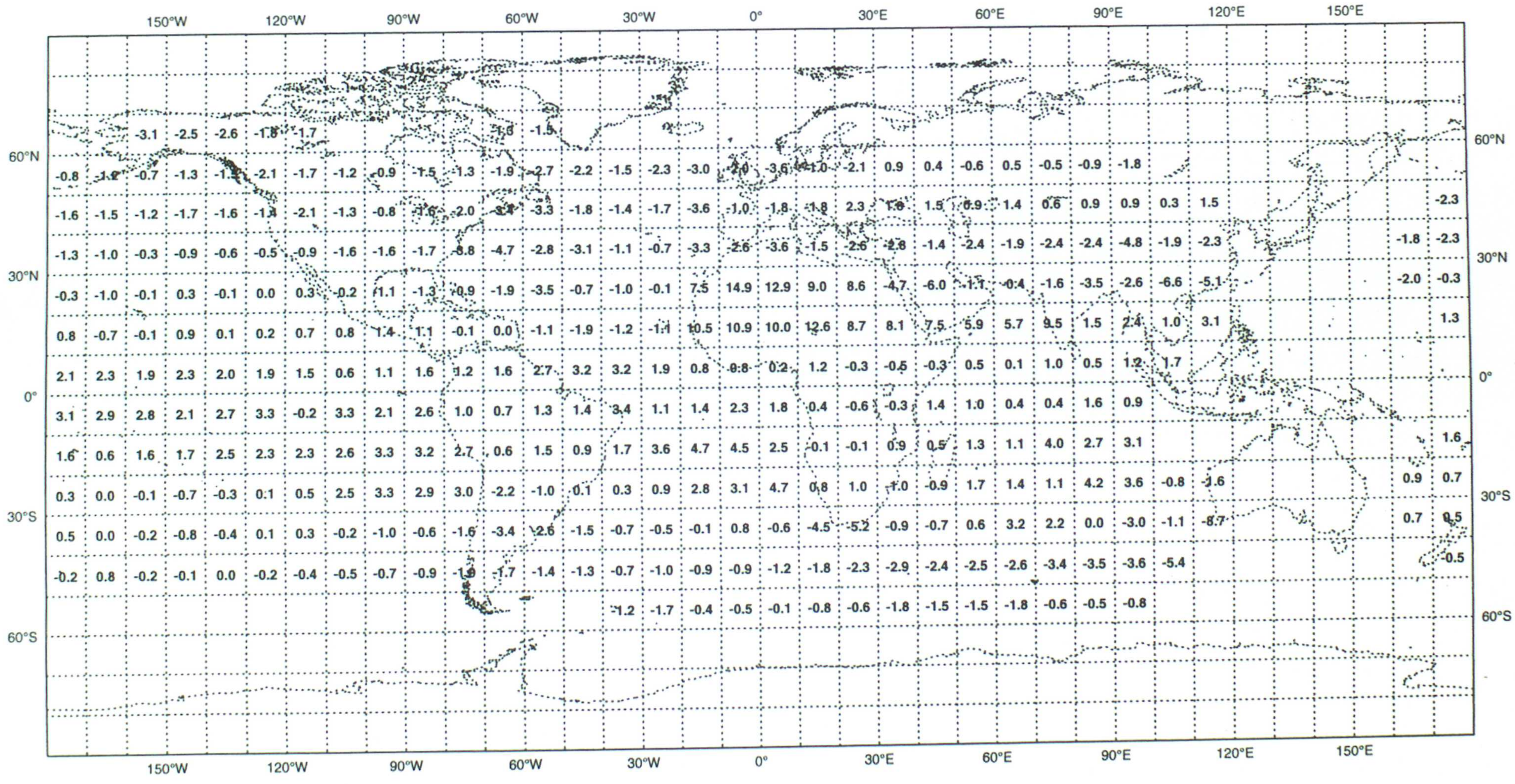

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
-3.1 -2.5 -2.6 -1.8 -1.7 -1.6 -1.5
-0.8 -1.2 -0.7 -1.3 -1.2 -2.1 -1.7 -1.2 -0.9 -1.5 -1.3 -1.9 -2.7 -2.2 -1.5 -2.3 -3.0 -2.0 -3.6 -1.0 -2.1 0.9 0.4 -0.6 0.5 -0.5 -0.9 -1.8
-1.6 -1.5 -1.2 -1.7 -1.6 -1.3 -2.1 -1.3 -0.8 -1.6 -2.0 -3.4 -3.3 -1.8 -1.4 -1.7 -3.6 -1.0 -1.8 -1.8 2.3 1.6 1.5 0.9 1.4 0.6 0.9 0.9 0.3 1.5 -2.3
-1.3 -1.0 -0.3 -0.9 -0.6 -0.5 -0.9 -1.6 -1.6 -1.7 -3.8 -4.7 -2.8 -3.1 -1.1 -0.7 -3.3 -2.6 -3.6 -1.5 -2.6 -2.8 -1.4 -2.4 -1.9 -2.4 -2.4 -4.8 -1.9 -2.3 -1.8 -2.3
-0.3 -1.0 -0.1 0.3 -0.1 0.0 0.3 -0.2 1.1 -1.3 -0.9 -1.9 -3.5 -0.7 -1.0 -0.1 7.5 14.9 12.9 9.0 8.6 -4.7 -6.0 -1.1 -0.4 -1.6 -3.5 -2.6 -6.6 -5.1 -2.0 -0.3
0.8 -0.7 -0.1 0.9 0.1 0.2 0.7 0.8 1.4 1.1 -0.1 0.0 -1.1 -1.9 -1.2 -1.1 10.5 10.9 10.0 12.6 8.7 8.1 7.5 5.9 5.7 9.5 1.5 2.4 1.0 3.1 1.3
2.1 2.3 1.9 2.3 2.0 1.9 1.5 0.6 1.1 1.6 1.2 1.6 2.7 3.2 3.2 1.9 0.8 8.8 0.2 1.2 -0.3 -0.5 -0.3 0.5 0.1 1.0 0.5 1.2 1.7
3.1 2.9 2.8 2.1 2.7 3.3 -0.2 3.3 2.1 2.6 1.0 0.7 1.3 1.4 3.4 1.1 1.4 2.3 1.8 0.4 -0.6 -0.3 1.4 1.0 0.4 0.4 1.6 0.9
1.6 0.6 1.6 1.7 2.5 2.3 2.3 2.6 3.3 3.2 2.7 0.6 1.5 0.9 1.7 3.6 4.7 4.5 2.5 -0.1 -0.1 0.9 0.5 1.3 1.1 4.0 2.7 3.1 1.6
0.3 0.0 -0.1 -0.7 -0.3 0.1 0.5 2.5 3.3 2.9 3.0 -2.2 -1.0 0.1 0.3 0.9 2.8 3.1 4.7 0.8 1.0 1.0 -0.9 1.7 1.4 1.1 4.2 3.6 -0.8 1.6 0.9 0.7
0.5 0.0 -0.2 -0.8 -0.4 0.1 0.3 -0.2 -1.0 -0.6 -1.6 -3.4 2.6 -1.5 -0.7 -0.5 -0.1 0.8 -0.6 -4.5 -5.2 -0.9 -0.7 0.6 3.2 2.2 0.0 -3.0 -1.1 -8.7 0.7 0.5
-0.2 0.8 -0.2 -0.1 0.0 -0.2 -0.4 -0.5 -0.7 -0.9 -1.9 -1.7 -1.4 -1.3 -0.7 -1.0 -0.9 -0.9 -1.2 -1.8 -2.3 -2.9 -2.4 -2.5 -2.6 -3.4 -3.5 -3.6 -5.4 -0.5
-1.2 -1.7 -0.4 -0.5 -0.1 -0.8 -0.6 -1.8 -1.5 -1.5 -1.8 -0.6 -0.5 -0.8

Figure 19. SATOB 401 - 700 hPa mean RMS O-B vector differences (ms-1). DECEMBER 2003
All observations
Values are plotted where greater than 10 obs are present

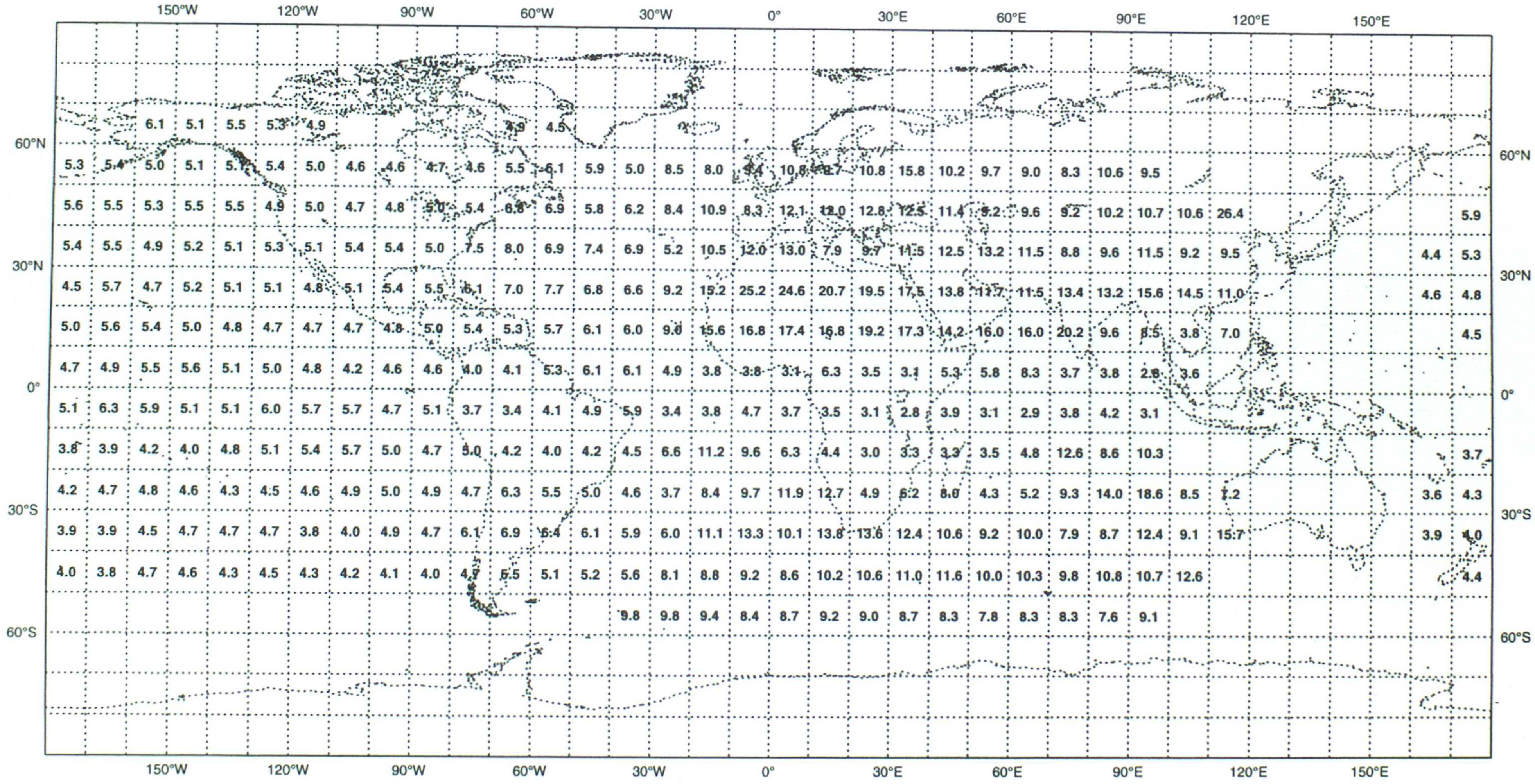

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
6.1 5.1 5.5 5.3 4.9 3.9 4.5
5.3 5.4 5.0 5.1 5.7 5.4 5.0 4.6 4.6 4.7 4.6 5.5 6.1 5.9 5.0 8.5 8.0 4.4 10.8 12.7 10.8 15.8 10.2 9.7 9.0 8.3 10.6 9.5
5.6 5.5 5.3 5.5 5.5 4.9 5.0 4.7 4.8 5.0 5.4 6.8 6.9 5.8 6.2 8.4 10.9 8.3 12.1 12.0 12.8 12.5 11.4 9.2 9.6 9.2 10.2 10.7 10.6 26.4 5.9
5.4 5.5 4.9 5.2 5.1 5.3 5.1 5.4 5.4 5.0 7.5 8.0 6.9 7.4 6.9 5.2 10.5 12.0 13.0 7.9 9.7 11.5 12.5 13.2 11.5 8.8 9.6 11.5 9.2 9.5 4.4 5.3
4.5 5.7 4.7 5.2 5.1 5.1 4.8 5.1 5.4 5.5 6.1 7.0 7.7 6.8 6.6 9.2 15.2 25.2 24.6 20.7 19.5 17.5 13.8 11.7 11.5 13.4 13.2 15.6 14.5 11.0 4.6 4.8
5.0 5.6 5.4 5.0 4.8 4.7 4.7 4.7 4.8 5.0 5.4 5.3 5.7 6.1 6.0 9.0 15.6 16.8 17.4 16.8 19.2 17.3 14.2 16.0 16.0 20.2 9.6 8.5 3.8 7.0 4.5
4.7 4.9 5.5 5.6 5.1 5.0 4.8 4.2 4.6 4.6 4.0 4.1 5.3 6.1 6.1 4.9 3.8 3.8 3.1 6.3 3.5 3.1 5.3 5.8 8.3 3.7 3.8 2.8 3.6
5.1 6.3 5.9 5.1 5.1 6.0 5.7 5.7 4.7 5.1 3.7 3.4 4.1 4.9 5.9 3.4 3.8 4.7 3.7 3.5 3.1 2.8 3.9 3.1 2.9 3.8 4.2 3.1
3.8 3.9 4.2 4.0 4.8 5.1 5.4 5.7 5.0 4.7 5.0 4.2 4.0 4.2 4.5 6.6 11.2 9.6 6.3 4.4 3.0 3.3 3.3 3.5 4.8 12.6 8.6 10.3 3.7
4.2 4.7 4.8 4.6 4.3 4.5 4.6 4.9 5.0 4.9 4.7 6.3 5.5 5.0 4.6 3.7 8.4 9.7 11.9 12.7 4.9 6.2 8.0 4.3 5.2 9.3 14.0 18.6 8.5 7.2 3.6 4.3
3.9 3.9 4.5 4.7 4.7 4.7 3.8 4.0 4.9 4.7 6.1 6.9 6.4 6.1 5.9 6.0 11.1 13.3 10.1 13.8 13.6 12.4 10.6 9.2 10.0 7.9 8.7 12.4 9.1 15.7 3.9 4.0
4.0 3.8 4.7 4.6 4.3 4.5 4.3 4.2 4.1 4.0 4.7 5.5 5.1 5.2 5.6 8.1 8.8 9.2 8.6 10.2 10.6 11.0 11.6 10.0 10.3 9.8 10.8 10.7 12.6 4.4
9.8 9.8 9.4 8.4 8.7 9.2 9.0 8.7 8.3 7.8 8.3 8.3 7.6 9.1

Figure 20. SATOB 101 - 400 hPa mean daily count. DECEMBER 2003
Global average number of observations in 24 hours = 239212

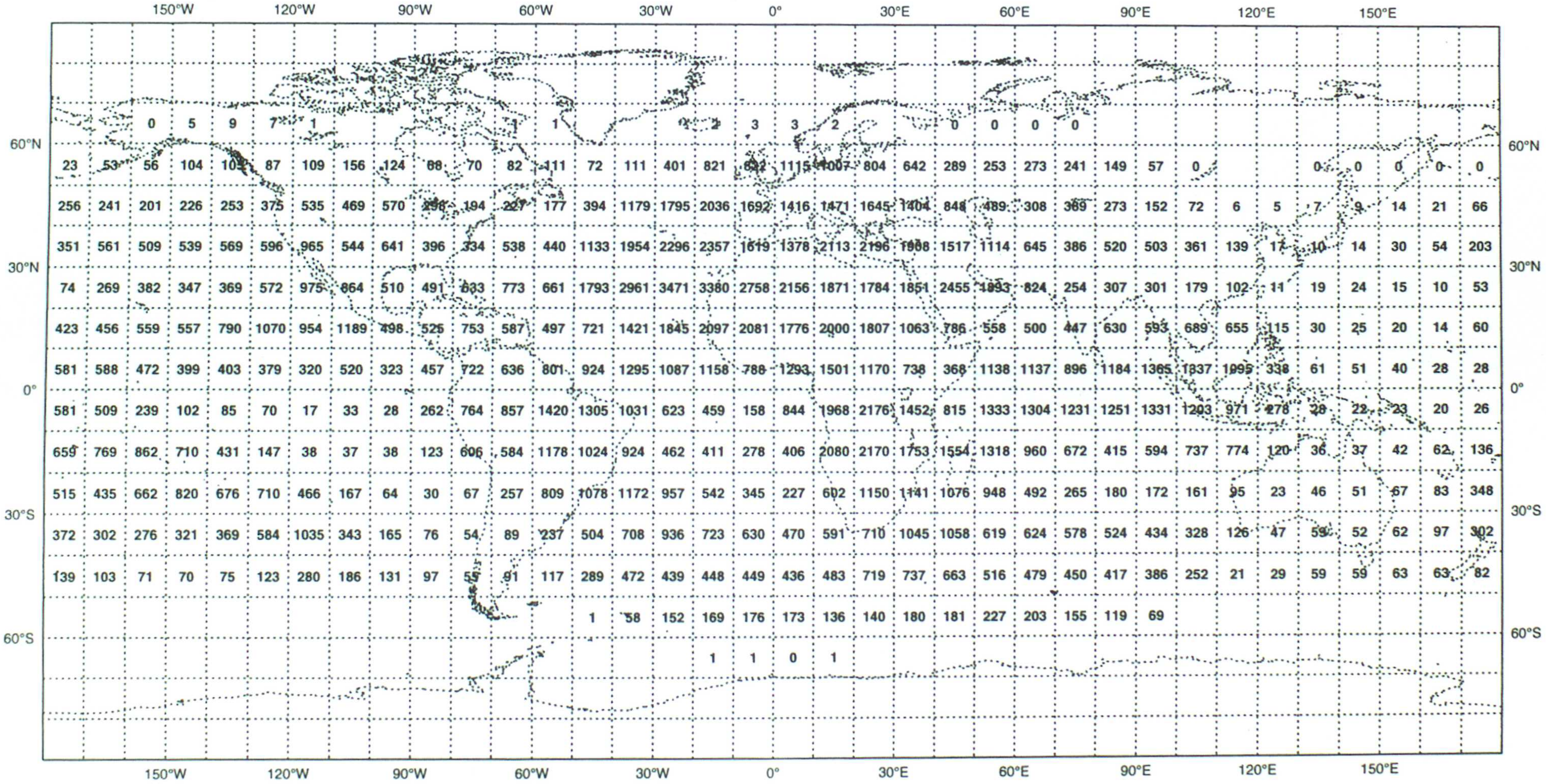

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
0 5 9 7 1 1 1 2 3 3 2 0 0 0 0
23 53 56 104 102 87 109 156 124 88 70 82 111 72 111 401 821 832 1115 1007 804 642 289 253 273 241 149 57 0 0 0 0 0 0
256 241 201 226 253 375 535 469 570 298 194 227 177 394 1179 1795 2036 1692 1416 1471 1645 1404 848 489 308 369 273 152 72 6 5 7 9 14 21 66
351 561 509 539 569 596 965 544 641 396 334 538 440 1133 1954 2296 2357 1619 1378 2113 2196 1988 1517 1114 645 386 520 503 361 139 17 10 14 30 54 203
74 269 382 347 369 572 975 864 510 491 633 773 661 1793 2961 3471 3380 2758 2156 1871 1784 1851 2455 1893 824 254 307 301 179 102 11 19 24 15 10 53
423 456 559 557 790 1070 954 1189 498 525 753 587 497 721 1421 1845 2097 2081 1776 2000 1807 1063 786 558 500 447 630 593 689 655 115 30 25 20 14 60
581 588 472 399 403 379 320 520 323 457 722 636 801 924 1295 1087 1158 788 1293 1501 1170 738 368 1138 1137 896 1184 1365 1837 1995 338 61 51 40 28 28
581 509 239 102 85 70 17 33 28 262 764 857 1420 1305 1031 623 459 158 844 1968 2176 1452 815 1333 1304 1231 1251 1331 1203 971 278 28 22 23 20 26
659 769 862 710 431 147 38 37 38 123 606 584 1178 1024 924 462 411 278 406 2080 2170 1753 1554 1318 960 672 415 594 737 774 120 36 37 42 62 136
515 435 662 820 676 710 466 167 64 30 67 257 809 1078 1172 957 542 345 227 602 1150 1141 1076 948 492 265 180 172 161 95 23 46 51 67 83 348
372 302 276 321 369 584 1035 343 165 76 54 89 237 504 708 936 723 630 470 591 710 1045 1058 619 624 578 524 434 328 126 47 59 52 62 97 302
139 103 71 70 75 123 280 186 131 97 55 91 117 289 472 439 448 449 436 483 719 737 663 516 479 450 417 386 252 21 29 59 59 63 63 82
1 58 152 169 176 173 136 140 180 181 227 203 155 119 69
1 1 0 1

Figure 21. SATOB 101 - 400 hPa vector mean wind. DECEMBER 2003
All observations
Arrows are plotted where greater than 10 obs are present

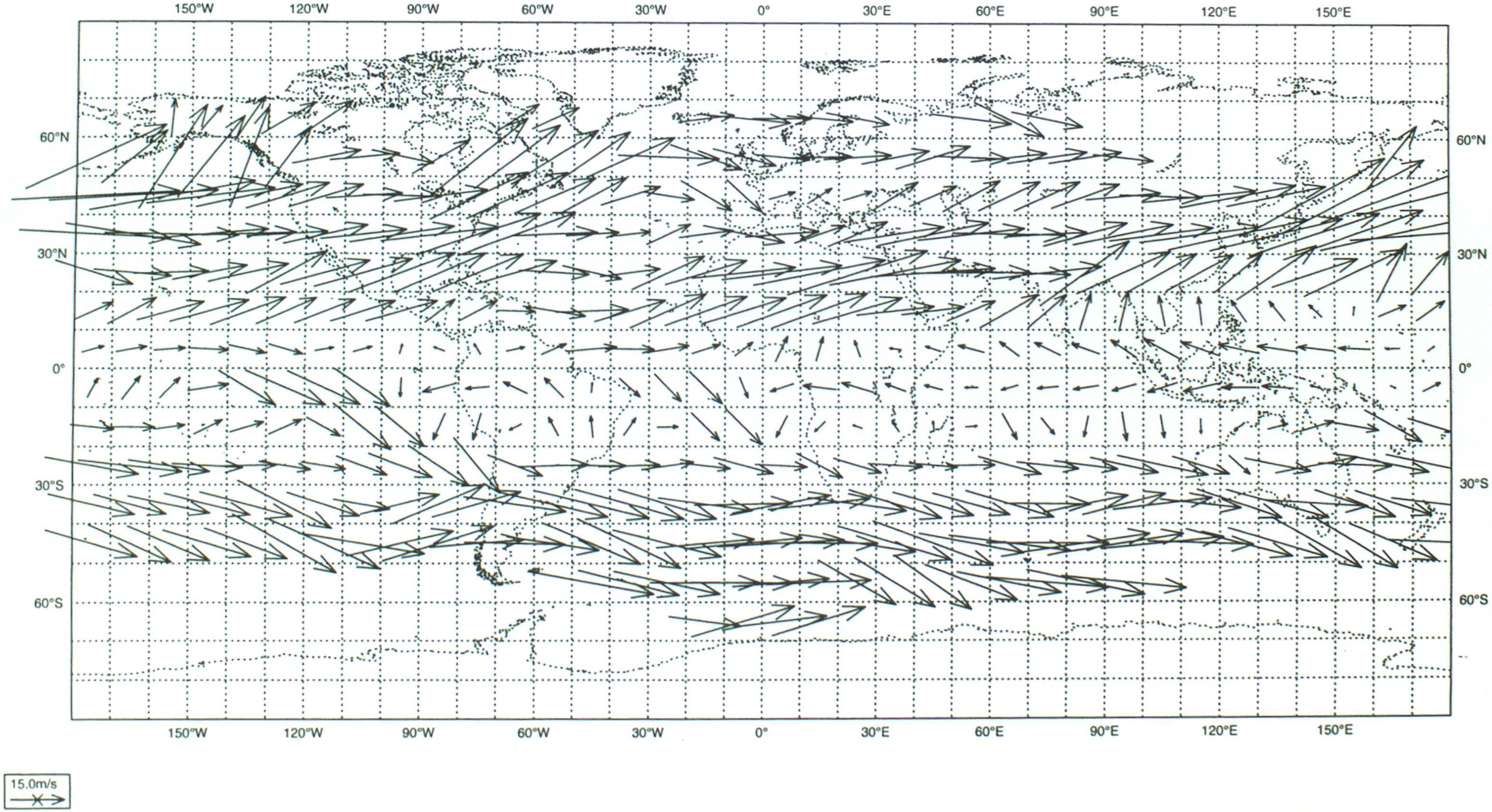

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
15.0m/s

Figure 22. SATOB 101 - 400 hPa mean vector wind differences. DECEMBER 2003
All observations
Arrows are plotted where greater than 10 obs are present

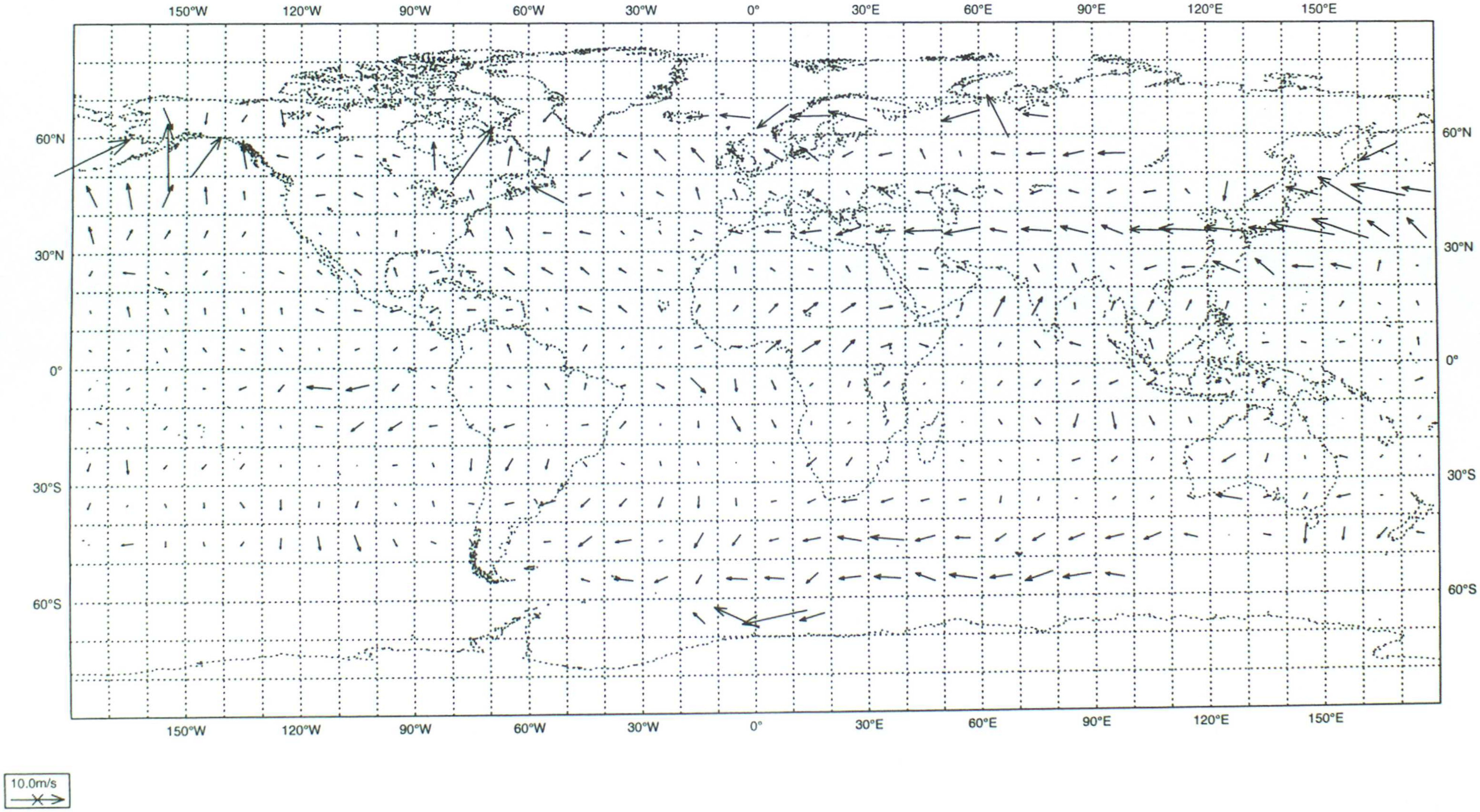

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
10.0m/s

Figure 23. SATOB 101 - 400 hPa mean O-B speed differences (ms-1). DECEMBER 2003
All observations
Values are plotted where greater than 10 obs are present

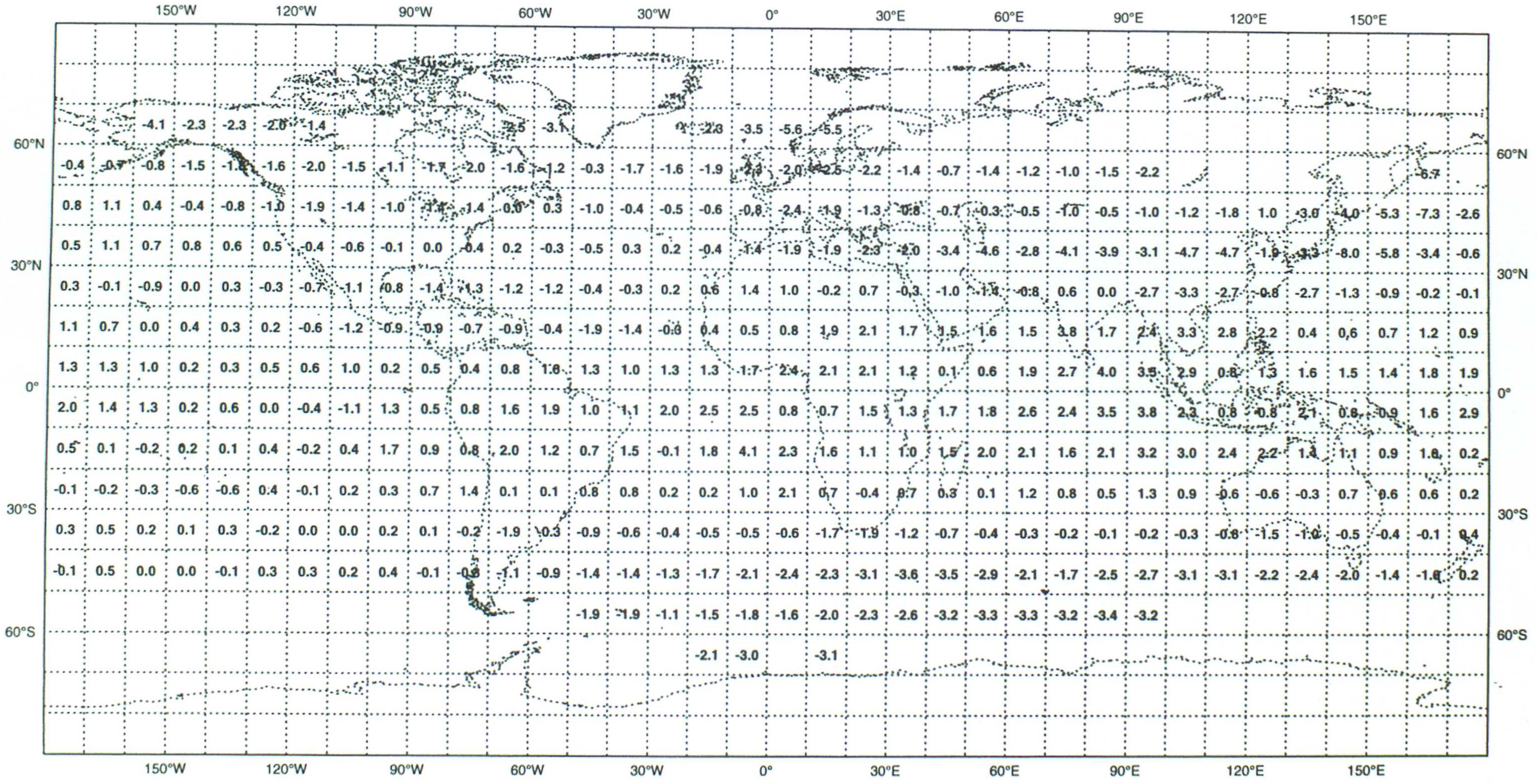
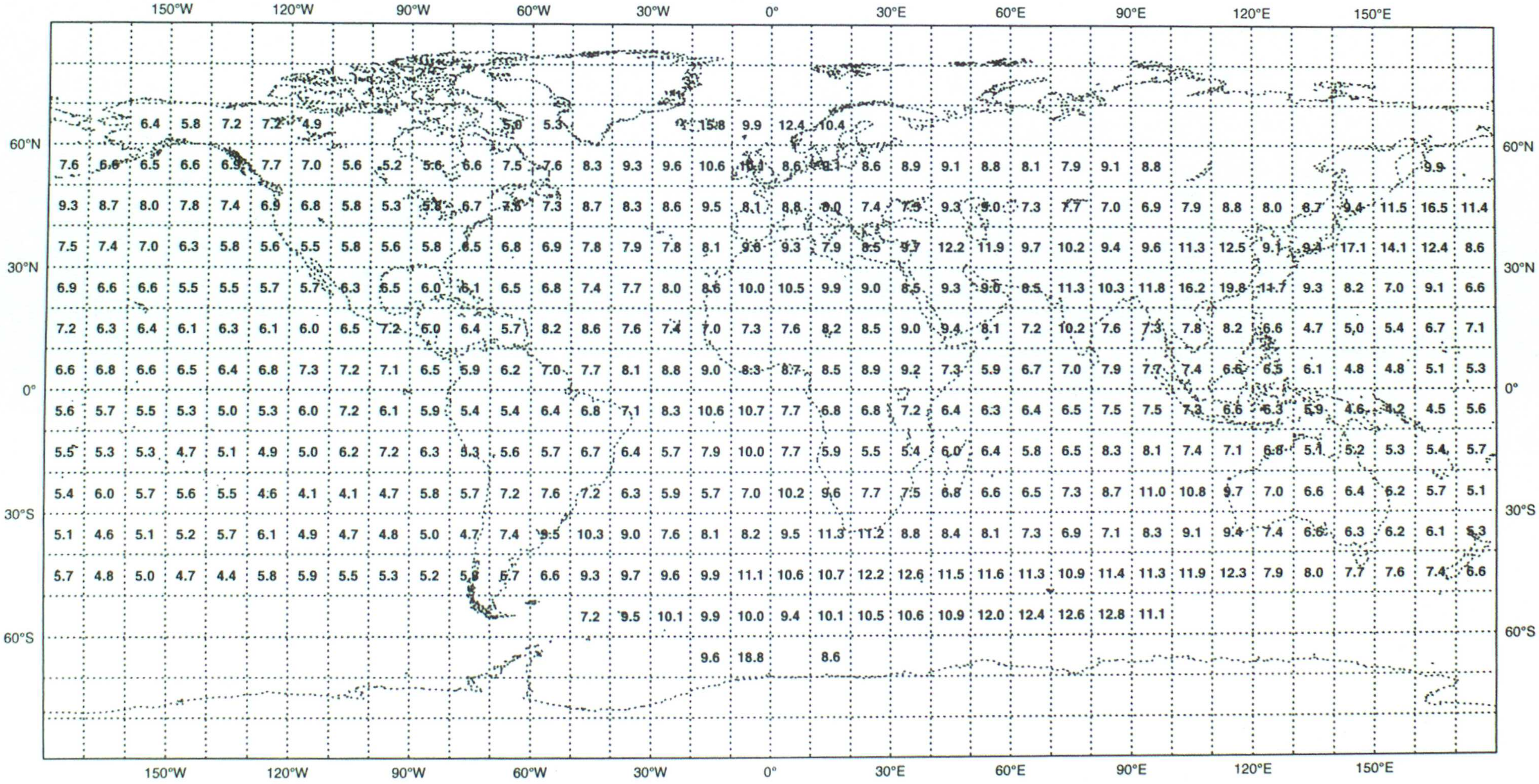

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N
30°N
0°
30°S
60°S
-4.1 -2.3 -2.3 -2.0 -1.4 -2.5 -3.1 -2.3 -3.5 -5.6 -5.5
-0.4 -0.7 -0.8 -1.5 -1.8 -1.6 -2.0 -1.5 -1.1 -1.7 -2.0 -1.6 -1.2 -0.3 -1.7 -1.6 -1.9 -2.4 -2.0 -2.5 -2.2 -1.4 -0.7 -1.4 -1.2 -1.0 -1.5 -2.2 -6.7
0.8 1.1 0.4 -0.4 -0.8 -1.0 -1.9 -1.4 -1.0 -1.4 -1.4 0.0 0.3 -1.0 -0.4 -0.5 -0.6 -0.8 -2.4 -1.9 -1.3 -0.8 -0.7 -0.3 -0.5 -1.0 -0.5 -1.0 -1.2 -1.8 1.0 -3.0 -4.0 -5.3 -7.3 -2.6
0.5 1.1 0.7 0.8 0.6 0.5 -0.4 -0.6 -0.1 0.0 0.4 0.2 -0.3 -0.5 0.3 0.2 -0.4 -1.4 -1.9 -1.9 -2.3 -2.0 -3.4 -4.6 -2.8 -4.1 -3.9 -3.1 -4.7 -4.7 -1.9 -3.3 -8.0 -5.8 -3.4 -0.6
0.3 -0.1 -0.9 0.0 0.3 -0.3 -0.7 -1.1 0.8 -1.4 -1.3 -1.2 -1.2 -0.4 -0.3 0.2 0.6 1.4 1.0 -0.2 0.7 -0.3 -1.0 -1.8 -0.8 0.6 0.0 -2.7 -3.3 -2.7 -0.8 -2.7 -1.3 -0.9 -0.2 -0.1
1.1 0.7 0.0 0.4 0.3 0.2 -0.6 -1.2 -0.9 -0.9 -0.7 -0.9 -0.4 -1.9 -1.4 -0.0 0.4 0.5 0.8 1.9 2.1 1.7 1.5 1.6 1.5 3.8 1.7 2.4 3.3 2.8 2.2 0.4 0.6 0.7 1.2 0.9
1.3 1.3 1.0 0.2 0.3 0.5 0.6 1.0 0.2 0.5 0.4 0.8 1.6 1.3 1.0 1.3 1.3 -1.7 2.4 2.1 2.1 1.2 0.1 0.6 1.9 2.7 4.0 3.5 2.9 0.8 1.3 1.6 1.5 1.4 1.8 1.9
2.0 1.4 1.3 0.2 0.6 0.0 -0.4 -1.1 1.3 0.5 0.8 1.6 1.9 1.0 1.1 2.0 2.5 2.5 0.8 0.7 1.5 1.3 1.7 1.8 2.6 2.4 3.5 3.8 2.3 0.8 -0.8 2.1 0.6 0.9 1.6 2.9
0.5 0.1 -0.2 0.2 0.1 0.4 -0.2 0.4 1.7 0.9 0.8 2.0 1.2 0.7 1.5 -0.1 1.8 4.1 2.3 1.6 1.1 1.0 1.5 2.0 2.1 1.6 2.1 3.2 3.0 2.4 2.2 1.4 1.1 0.9 1.8 0.2
-0.1 -0.2 -0.3 -0.6 -0.6 0.4 -0.1 0.2 0.3 0.7 1.4 0.1 0.1 0.8 0.8 0.2 0.2 1.0 2.1 0.7 -0.4 0.7 0.3 0.1 1.2 0.8 0.5 1.3 0.9 0.6 -0.6 -0.3 0.7 0.6 0.6 0.2
0.3 0.5 0.2 0.1 0.3 -0.2 0.0 0.0 0.2 0.1 -0.2 -1.9 0.3 -0.9 -0.6 -0.4 -0.5 -0.5 -0.6 -1.7 -1.9 -1.2 -0.7 -0.4 -0.3 -0.2 -0.1 -0.2 -0.3 -0.8 -1.5 -1.0 -0.5 -0.4 -0.1 0.4
-0.1 0.5 0.0 0.0 -0.1 0.3 0.3 0.2 0.4 -0.1 -0.8 -1.1 -0.9 -1.4 -1.4 -1.3 -1.7 -2.1 -2.4 -2.3 -3.1 -3.6 -3.5 -2.9 -2.1 -1.7 -2.5 -2.7 -3.1 -3.1 -2.2 -2.4 -2.0 -1.4 -1.8 0.2
-1.9 -1.9 -1.1 -1.5 -1.8 -1.6 -2.0 -2.3 -2.6 -3.2 -3.3 -3.3 -3.2 -3.4 -3.2
-2.1 -3.0 -3.1

Figure 24. SATOB 101 - 400 hPa mean RMS O-B vector differences (ms-1). DECEMBER 2003
All observations
Values are plotted where greater than 10 obs are present


150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
6.4 5.8 7.2 7.2 4.9 5.0 5.3 15.8 9.9 12.4 10.4
7.6 6.6 6.5 6.6 6.9 7.7 7.0 5.6 5.2 5.6 6.6 7.5 7.6 8.3 9.3 9.6 10.6 10.1 8.6 8.1 8.6 8.9 9.1 8.8 8.1 7.9 9.1 8.8 9.9
9.3 8.7 8.0 7.8 7.4 6.9 6.8 5.8 5.3 5.8 6.7 7.8 7.3 8.7 8.3 8.6 9.5 8.1 8.8 8.0 7.4 7.9 9.3 9.0 7.3 7.7 7.0 6.9 7.9 8.8 8.0 8.7 9.4 11.5 16.5 11.4
7.5 7.4 7.0 6.3 5.8 5.6 5.5 5.8 5.6 5.8 6.5 6.8 6.9 7.8 7.9 7.8 8.1 9.6 9.3 7.9 8.5 9.7 12.2 11.9 9.7 10.2 9.4 9.6 11.3 12.5 9.1 9.4 17.1 14.1 12.4 8.6
6.9 6.6 6.6 5.5 5.5 5.7 5.7 6.3 6.5 6.0 6.1 6.5 6.8 7.4 7.7 8.0 8.6 10.0 10.5 9.9 9.0 8.5 9.3 9.0 8.5 11.3 10.3 11.8 16.2 19.8 14.7 9.3 8.2 7.0 9.1 6.6
7.2 6.3 6.4 6.1 6.3 6.1 6.0 6.5 7.2 6.0 6.4 5.7 8.2 8.6 7.6 7.4 7.0 7.3 7.6 8.2 8.5 9.0 9.4 8.1 7.2 10.2 7.6 7.3 7.8 8.2 6.6 4.7 5.0 5.4 6.7 7.1
6.6 6.8 6.6 6.5 6.4 6.8 7.3 7.2 7.1 6.5 5.9 6.2 7.0 7.7 8.1 8.8 9.0 8.3 8.7 8.5 8.9 9.2 7.3 5.9 6.7 7.0 7.9 7.7 7.4 6.6 6.5 6.1 4.8 4.8 5.1 5.3
5.6 5.7 5.5 5.3 5.0 5.3 6.0 7.2 6.1 5.9 5.4 5.4 6.4 6.8 7.1 8.3 10.6 10.7 7.7 6.8 6.8 7.2 6.4 6.3 6.4 6.5 7.5 7.5 7.3 6.6 6.3 5.9 4.6 4.2 4.5 5.6
5.5 5.3 5.3 4.7 5.1 4.9 5.0 6.2 7.2 6.3 5.3 5.6 5.7 6.7 6.4 5.7 7.9 10.0 7.7 5.9 5.5 5.4 6.0 6.4 5.8 6.5 8.3 8.1 7.4 7.1 6.8 5.1 5.2 5.3 5.4 5.7
5.4 6.0 5.7 5.6 5.5 4.6 4.1 4.1 4.7 5.8 5.7 7.2 7.6 7.2 6.3 5.9 5.7 7.0 10.2 9.6 7.7 7.5 6.8 6.6 6.5 7.3 8.7 11.0 10.8 9.7 7.0 6.6 6.4 6.2 5.7 5.1
5.1 4.6 5.1 5.2 5.7 6.1 4.9 4.7 4.8 5.0 4.7 7.4 9.5 10.3 9.0 7.6 8.1 8.2 9.5 11.3 11.2 8.8 8.4 8.1 7.3 6.9 7.1 8.3 9.1 9.4 7.4 6.6 6.3 6.2 6.1 5.3
5.7 4.8 5.0 4.7 4.4 5.8 5.9 5.5 5.3 5.2 5.8 5.7 6.6 9.3 9.7 9.6 9.9 11.1 10.6 10.7 12.2 12.6 11.5 11.6 11.3 10.9 11.4 11.3 11.9 12.3 7.9 8.0 7.7 7.6 7.4 6.6
7.2 9.5 10.1 9.9 10.0 9.4 10.1 10.5 10.6 10.9 12.0 12.4 12.6 12.8 11.1
9.6 18.8 8.6

MONITORING OF SATELLITE TEMPERATURES

MONITORING CENTRE: EXETER

MONTH: Dec 2003

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from NOAA-15, NOAA-16 and NOAA-17.

Standard of comparison :Background field from UKMO global model.

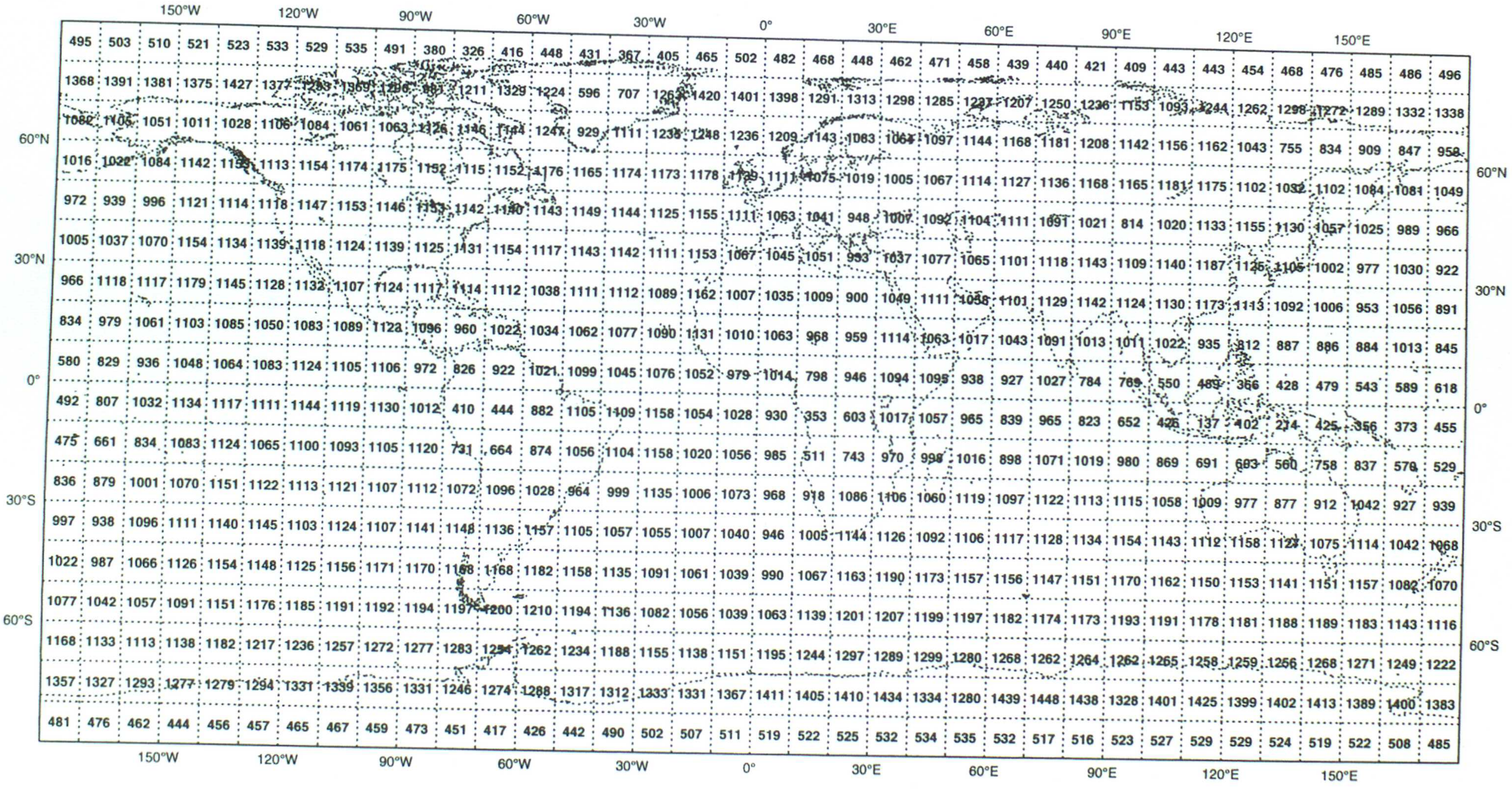
Selection Criteria :All soundings.

Data Extracted :Sounding channels (and approximate weighting function peaks, hPa)

- HIRS8 (Surface)
- HIRS15 (700)
- HIRS11 (500-700)
- HIRS4 (400)
- AMSUA5 (700)
- AMSUA7 (300)
- AMSUA9 (100)

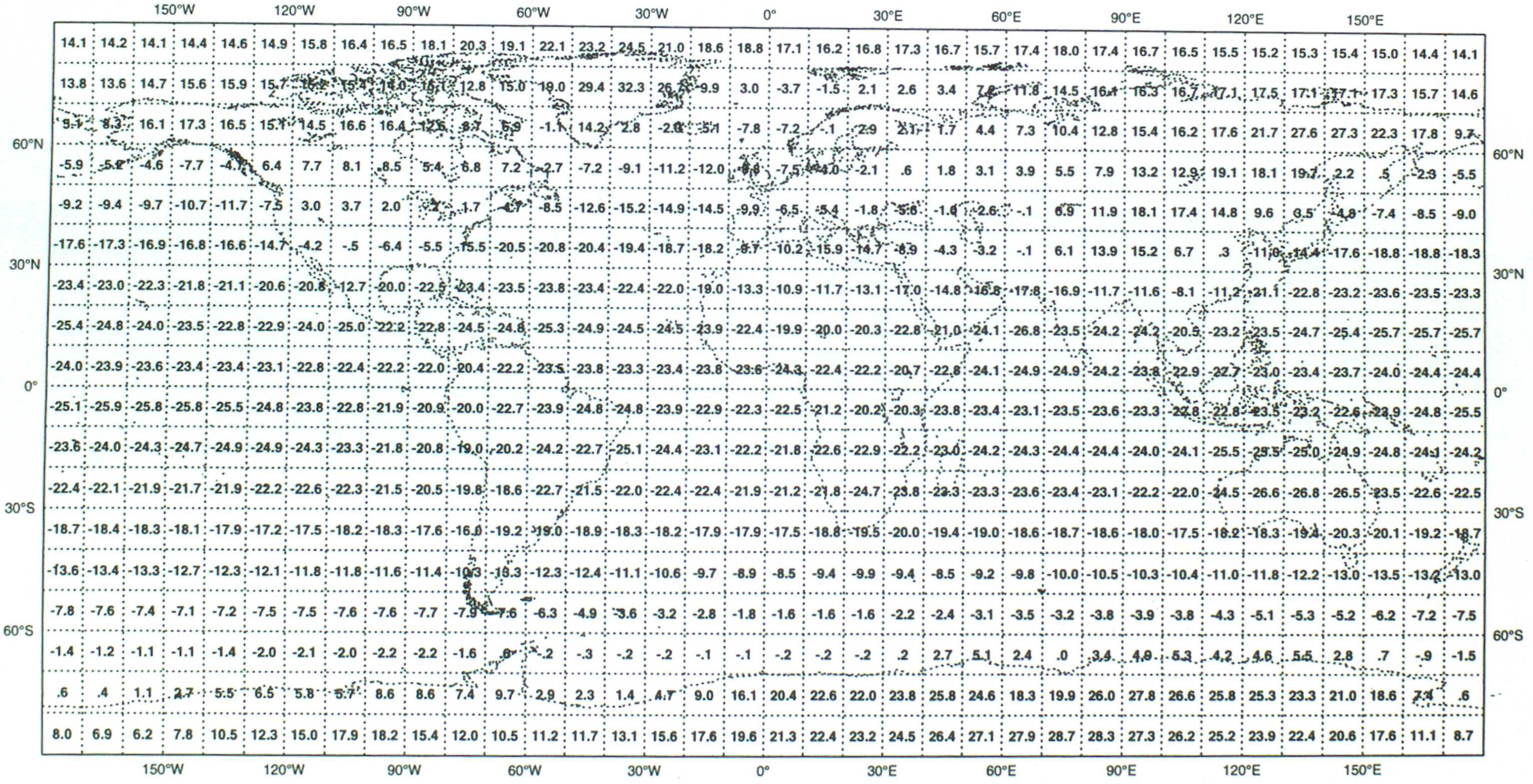
:Mean and standard deviation observation-minus-background brightness temperature differences

Figure 25. ATOVS mean daily count. DECEMBER 2003
NOAA15, using all observations
Global average number of observations in 24 hours = 655584



495	503	510	521	523	533	529	535	491	380	326	416	448	431	367	405	465	502	482	468	448	462	471	458	439	440	421	409	443	443	454	468	476	485	486	496
1368	1391	1381	1375	1427	1377	1283	1369	1296	881	1211	1329	1224	596	707	1263	1420	1401	1398	1291	1313	1298	1285	1227	1207	1250	1236	1153	1093	1244	1262	1298	1272	1289	1332	1338
1082	1105	1051	1011	1028	1106	1084	1061	1063	1126	1146	1144	1247	929	1111	1238	1248	1236	1209	1143	1083	1064	1097	1144	1168	1181	1208	1142	1156	1162	1043	755	834	909	847	958
1016	1022	1084	1142	1153	1113	1154	1174	1175	1152	1115	1152	1176	1165	1174	1173	1178	1129	1111	1075	1019	1005	1067	1114	1127	1136	1168	1165	1181	1175	1102	1032	1102	1084	1081	1049
972	939	996	1121	1114	1118	1147	1153	1146	1153	1142	1140	1143	1149	1144	1125	1155	1111	1063	1041	948	1007	1092	1104	1111	1091	1021	814	1020	1133	1155	1130	1057	1025	989	966
1005	1037	1070	1154	1134	1139	1118	1124	1139	1125	1131	1154	1117	1143	1142	1111	1153	1067	1045	1051	993	1037	1077	1065	1101	1118	1143	1109	1140	1187	1125	1105	1002	977	1030	922
966	1118	1117	1179	1145	1128	1132	1107	1124	1117	1114	1112	1038	1111	1112	1089	1162	1007	1035	1009	900	1049	1111	1058	1101	1129	1142	1124	1130	1173	1113	1092	1006	953	1056	891
834	979	1061	1103	1085	1050	1083	1089	1123	1096	960	1022	1034	1062	1077	1090	1131	1010	1063	968	959	1114	1063	1017	1043	1091	1013	1011	1022	935	812	887	886	884	1013	845
580	829	936	1048	1064	1083	1124	1105	1106	972	826	922	1021	1099	1045	1076	1052	979	1014	798	946	1094	1095	938	927	1027	784	769	550	489	366	428	479	543	589	618
492	807	1032	1134	1117	1111	1144	1119	1130	1012	410	444	882	1105	1109	1158	1054	1028	930	353	603	1017	1057	965	839	965	823	652	426	137	402	214	425	356	373	455
475	661	834	1083	1124	1065	1100	1093	1105	1120	731	664	874	1056	1104	1158	1020	1056	985	511	743	970	998	1016	898	1071	1019	980	869	691	683	560	758	837	578	529
836	879	1001	1070	1151	1122	1113	1121	1107	1112	1072	1096	1028	964	999	1135	1006	1073	968	918	1086	1106	1060	1119	1097	1122	1113	1115	1058	1009	977	877	912	1042	927	939
997	938	1096	1111	1140	1145	1103	1124	1107	1141	1148	1136	1157	1105	1057	1055	1007	1040	946	1005	1144	1126	1092	1106	1117	1128	1134	1154	1143	1112	1158	1127	1075	1114	1042	1068
1022	987	1066	1126	1154	1148	1125	1156	1171	1170	1168	1168	1182	1158	1135	1091	1061	1039	990	1067	1163	1190	1173	1157	1156	1147	1151	1170	1162	1150	1153	1141	1151	1157	1082	1070
1077	1042	1057	1091	1151	1176	1185	1191	1192	1194	1197	1200	1210	1194	1136	1082	1056	1039	1063	1139	1201	1207	1199	1197	1182	1174	1173	1193	1191	1178	1181	1188	1189	1183	1143	1116
1168	1133	1113	1138	1182	1217	1236	1257	1272	1277	1283	1254	1262	1234	1188	1155	1138	1151	1195	1244	1297	1289	1299	1280	1268	1262	1264	1262	1265	1258	1259	1256	1268	1271	1249	1222
1357	1327	1293	1277	1279	1294	1331	1339	1356	1331	1246	1274	1288	1317	1312	1333	1331	1367	1411	1405	1410	1434	1334	1280	1439	1448	1438	1328	1401	1425	1399	1402	1413	1389	1400	1383
481	476	462	444	456	457	465	467	459	473	451	417	426	442	490	502	507	511	519	522	525	532	534	535	532	517	516	523	527	529	529	524	519	522	508	485

Figure 26. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS8 (Surface)
NOAA15, using all observations



14.1	14.2	14.1	14.4	14.6	14.9	15.8	16.4	16.5	18.1	20.3	19.1	22.1	23.2	24.5	21.0	18.6	18.8	17.1	16.2	16.8	17.3	16.7	15.7	17.4	18.0	17.4	16.7	16.5	15.5	15.2	15.3	15.4	15.0	14.4	14.1
13.8	13.6	14.7	15.6	15.9	15.7	16.2	15.4	14.0	16.1	12.8	15.0	19.0	29.4	32.3	26.7	-9.9	3.0	-3.7	-1.5	2.1	2.6	3.4	7.8	11.8	14.5	16.4	16.3	16.7	17.1	17.5	17.1	17.1	17.3	15.7	14.6
5.1	8.3	16.1	17.3	16.5	15.1	14.5	16.6	16.4	12.6	8.7	6.9	-1.1	14.2	2.8	-2.0	-5.1	-7.8	-7.2	-.1	2.9	2.1	1.7	4.4	7.3	10.4	12.8	15.4	16.2	17.6	21.7	27.6	27.3	22.3	17.8	9.7
-5.9	-5.2	-4.6	-7.7	-4.7	6.4	7.7	8.1	8.5	5.4	6.8	7.2	-2.7	-7.2	-9.1	-11.2	-12.0	-8.8	-7.5	-4.0	-2.1	.6	1.8	3.1	3.9	5.5	7.9	13.2	12.9	19.1	18.1	19.7	2.2	.5	-2.3	-5.5
-9.2	-9.4	-9.7	-10.7	-11.7	-7.5	3.0	3.7	2.0	-.2	1.7	-4.7	-8.5	-12.6	-15.2	-14.9	-14.5	-9.9	-6.5	-5.4	-1.8	-5.6	-1.6	-2.6	-.1	6.9	11.9	18.1	17.4	14.8	9.6	6.5	-4.8	-7.4	-8.5	-9.0
-17.6	-17.3	-16.9	-16.8	-16.6	-14.7	-4.2	-.5	-6.4	-5.5	-15.5	-20.5	-20.8	-20.4	-19.4	-18.7	-18.2	-8.7	-10.2	-15.9	-14.7	-8.9	-4.3	-3.2	-.1	6.1	13.9	15.2	6.7	.3	-11.0	-14.4	-17.6	-18.8	-18.8	-18.3
-23.4	-23.0	-22.3	-21.8	-21.1	-20.6	-20.8	-12.7	-20.0	-22.5	-23.4	-23.5	-23.8	-23.4	-22.4	-22.0	-19.0	-13.3	-10.9	-11.7	-13.1	-17.0	-14.8	-16.8	-17.8	-16.9	-11.7	-11.6	-8.1	-11.2	-21.1	-22.8	-23.2	-23.6	-23.5	-23.3
-25.4	-24.8	-24.0	-23.5	-22.8	-22.9	-24.0	-25.0	-22.2	-22.8	-24.5	-24.8	-25.3	-24.9	-24.5	-24.5	-23.9	-22.4	-19.9	-20.0	-20.3	-22.8	-21.0	-24.1	-26.8	-23.5	-24.2	-24.2	-20.5	-23.2	-23.5	-24.7	-25.4	-25.7	-25.7	-25.7
-24.0	-23.9	-23.6	-23.4	-23.4	-23.1	-22.8	-22.4	-22.2	-22.0	-20.4	-22.2	-23.5	-23.8	-23.3	-23.4	-23.8	-23.6	-24.3	-22.4	-22.2	-20.7	-22.8	-24.1	-24.9	-24.9	-24.2	-23.8	-22.9	-22.7	-23.0	-23.4	-23.7	-24.0	-24.4	-24.4
-25.1	-25.9	-25.8	-25.8	-25.5	-24.8	-23.8	-22.8	-21.9	-20.9	-20.0	-22.7	-23.9	-24.8	-24.8	-23.9	-22.9	-22.3	-22.5	-21.2	-20.2	-20.3	-23.8	-23.4	-23.1	-23.5	-23.6	-23.3	-22.8	-22.8	-23.5	-23.2	-22.6	-23.9	-24.8	-25.5
-23.6	-24.0	-24.3	-24.7	-24.9	-24.9	-24.3	-23.3	-21.8	-20.8	-19.0	-20.2	-24.2	-22.7	-25.1	-24.4	-23.1	-22.2	-21.8	-22.6	-22.9	-22.2	-23.0	-24.2	-24.3	-24.4	-24.4	-24.0	-24.1	-25.5	-25.5	-25.0	-24.9	-24.8	-24.1	-24.2
-22.4	-22.1	-21.9	-21.7	-21.9	-22.2	-22.6	-22.3	-21.5	-20.5	-19.8	-18.6	-22.7	-21.5	-22.0	-22.4	-22.4	-21.9	-21.2	-21.8	-24.7	-23.8	-23.3	-23.3	-23.6	-23.4	-23.1	-22.2	-22.0	-24.5	-26.6	-26.8	-26.5	-23.5	-22.6	-22.5
-18.7	-18.4	-18.3	-18.1	-17.9	-17.2	-17.5	-18.2	-18.3	-17.6	-16.0	-19.2	-19.0	-18.9	-18.3	-18.2	-17.9	-17.9	-17.5	-18.8	-19.5	-20.0	-19.4	-19.0	-18.6	-18.7	-18.6	-18.0	-17.5	-18.2	-18.3	-19.4	-20.3	-20.1	-19.2	-18.7
-13.6	-13.4	-13.3	-12.7	-12.3	-12.1	-11.8	-11.8	-11.6	-11.4	-10.3	-18.3	-12.3	-12.4	-11.1	-10.6	-9.7	-8.9	-8.5	-9.4	-9.9	-9.4	-8.5	-9.2	-9.8	-10.0	-10.5	-10.3	-10.4	-11.0	-11.8	-12.2	-13.0	-13.5	-13.2	-13.0
-7.8	-7.6	-7.4	-7.1	-7.2	-7.5	-7.5	-7.6	-7.6	-7.7	-7.9	-7.6	-6.3	-4.9	-3.6	-3.2	-2.8	-1.8	-1.6	-1.6	-1.6	-2.2	-2.4	-3.1	-3.5	-3.2	-3.8	-3.9	-3.8	-4.3	-5.1	-5.3	-5.2	-6.2	-7.2	-7.5
-1.4	-1.2	-1.1	-1.1	-1.4	-2.0	-2.1	-2.0	-2.2	-2.2	-1.6	.6	-.2	-.3	-.2	-.2	-.1	-.1	-.2	-.2	-.2	.2	2.7	5.1	2.4	.0	3.4	4.9	5.3	4.2	4.6	5.5	2.8	.7	-.9	-1.5
.6	.4	1.1	2.7	5.5	6.5	5.8	5.7	8.6	8.6	7.4	9.7	2.9	2.3	1.4	4.7	9.0	16.1	20.4	22.6	22.0	23.8	25.8	24.6	18.3	19.9	26.0	27.8	26.6	25.8	25.3	23.3	21.0	18.6	7.4	.6
8.0	6.9	6.2	7.8	10.5	12.3	15.0	17.9	18.2	15.4	12.0	10.5	11.2	11.7	13.1	15.6	17.6	19.6	21.3	22.4	23.2	24.5	26.4	27.1	27.9	28.7	28.3	27.3	26.2	25.2	23.9	22.4	20.6	17.6	11.1	8.7

Figure 27. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS8 (Surface)
NOAA15, using all observations

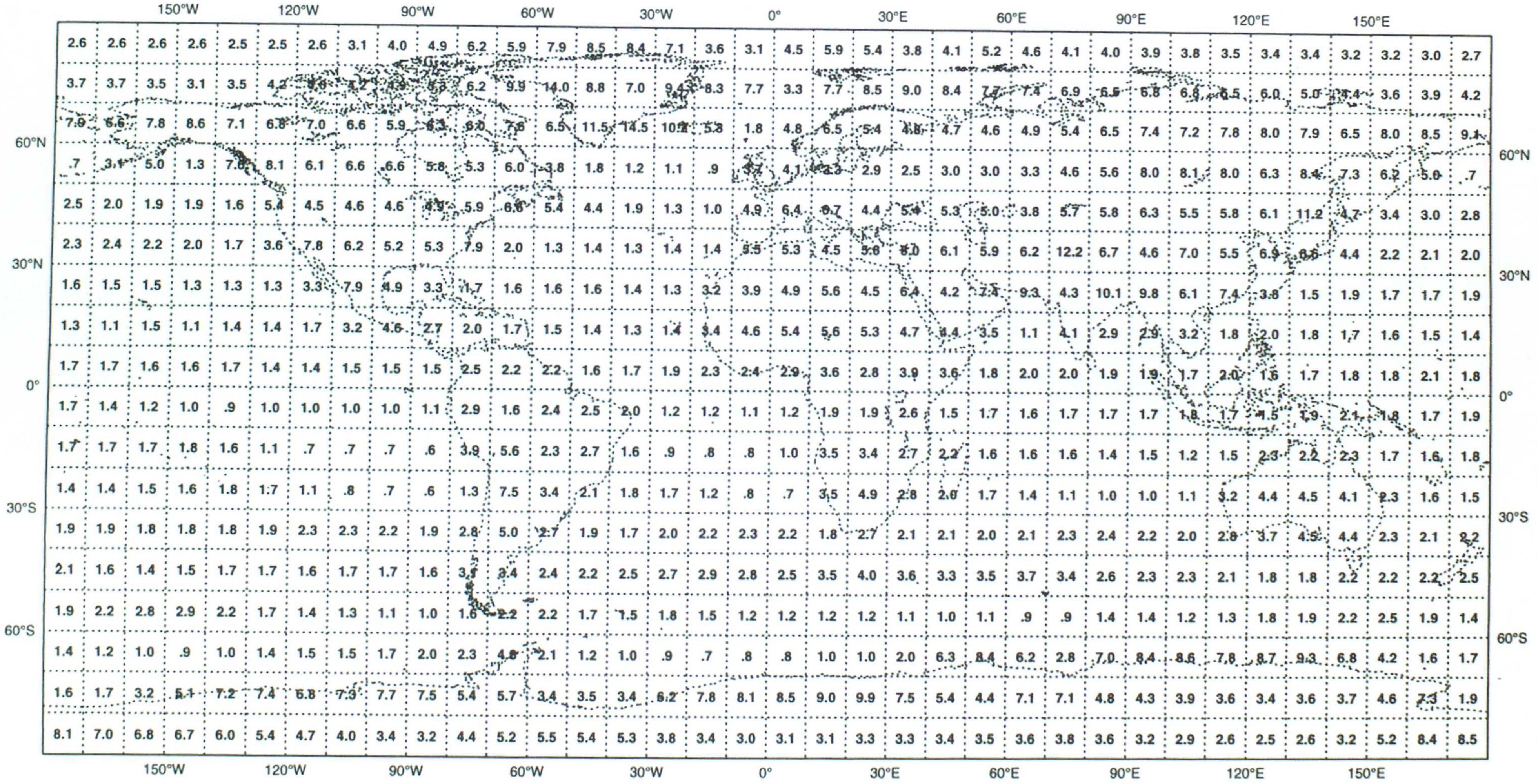
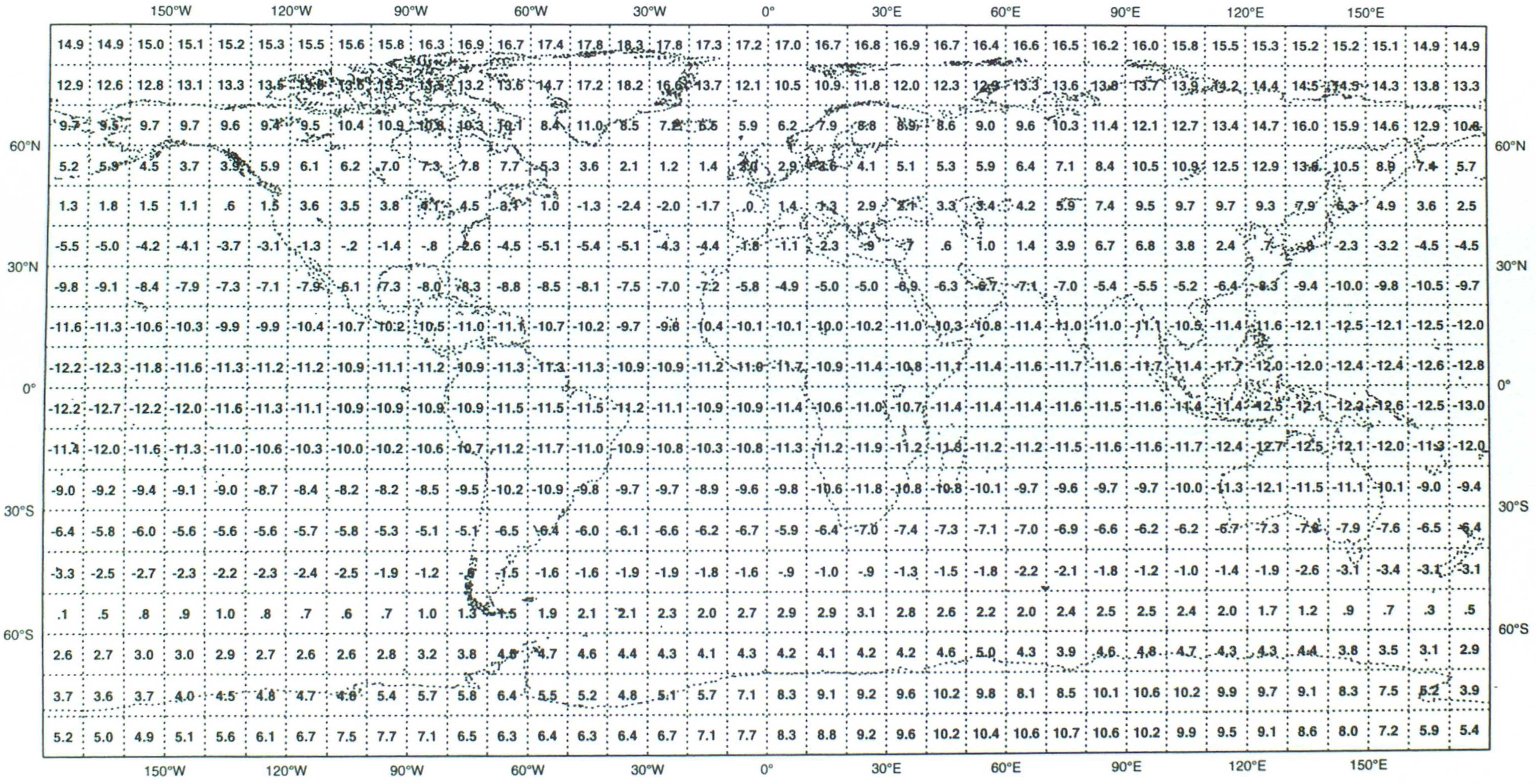
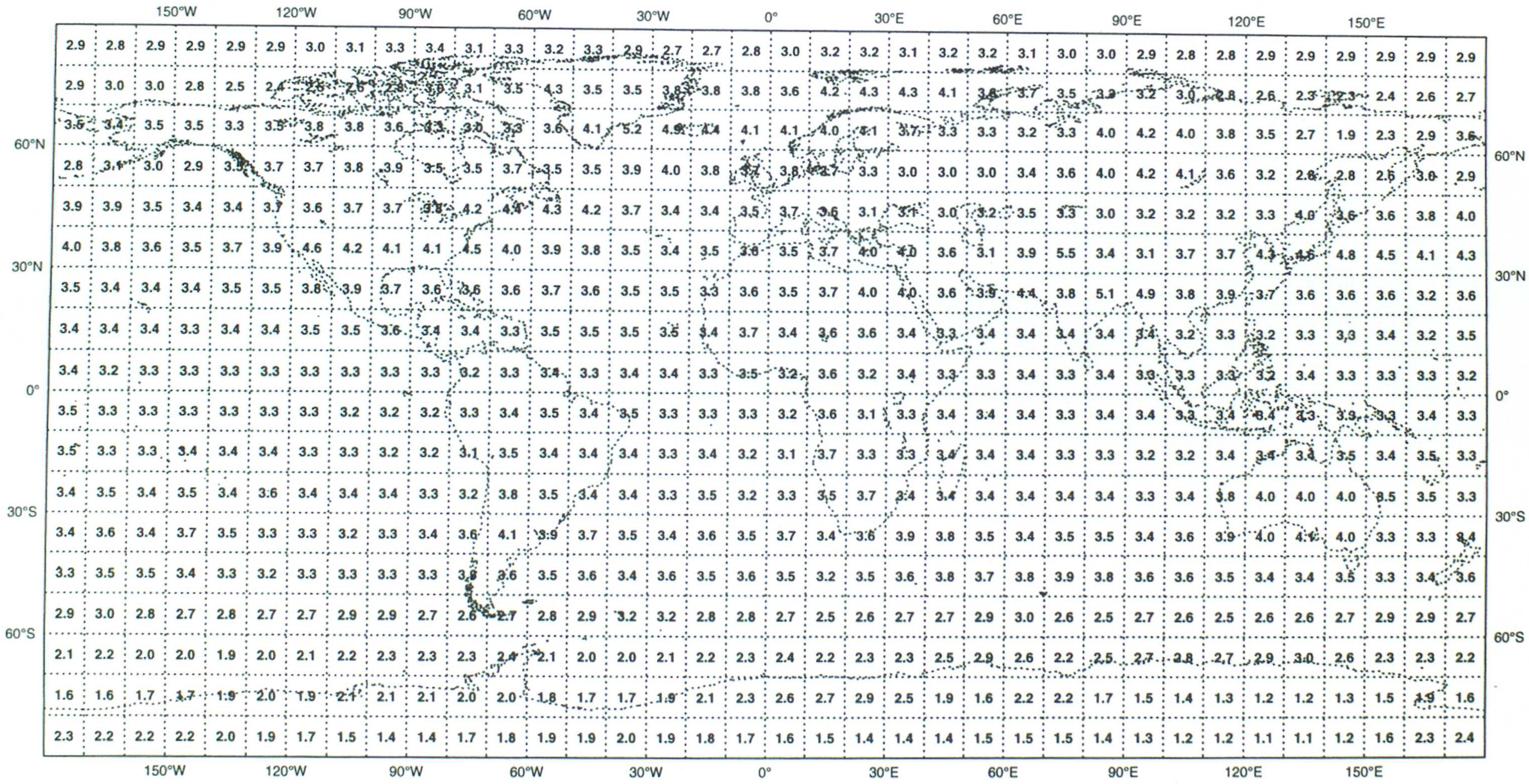

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

Figure 28. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS15 (700 hPa)
NOAA15, using all observations



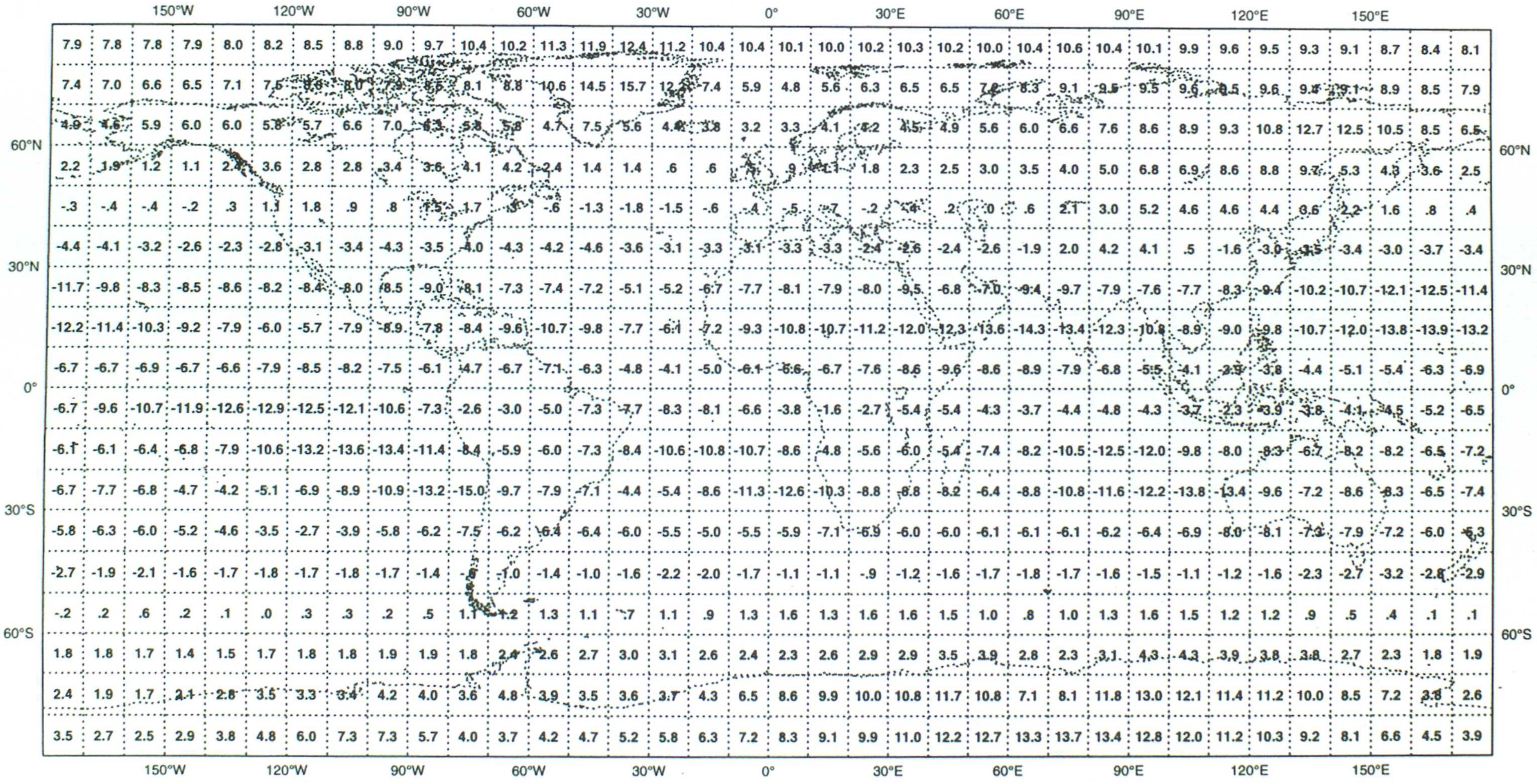
14.9	14.9	15.0	15.1	15.2	15.3	15.5	15.6	15.8	16.3	16.9	16.7	17.4	17.8	18.3	17.8	17.3	17.2	17.0	16.7	16.8	16.9	16.7	16.4	16.6	16.5	16.2	16.0	15.8	15.5	15.3	15.2	15.2	15.1	14.9	14.9
12.9	12.6	12.8	13.1	13.3	13.5	13.8	13.6	13.5	13.5	13.2	13.6	14.7	17.2	18.2	16.6	13.7	12.1	10.5	10.9	11.8	12.0	12.3	12.9	13.3	13.6	13.8	13.7	13.9	14.2	14.4	14.5	14.5	14.3	13.8	13.3
9.7	9.5	9.7	9.7	9.6	9.4	9.5	10.4	10.9	10.8	10.3	10.1	8.4	11.0	8.5	7.2	5.5	5.9	6.2	7.9	8.8	8.9	8.6	9.0	9.6	10.3	11.4	12.1	12.7	13.4	14.7	16.0	15.9	14.6	12.9	10.8
5.2	5.9	4.5	3.7	3.9	5.9	6.1	6.2	7.0	7.3	7.8	7.7	5.3	3.6	2.1	1.2	1.4	2.0	2.9	2.6	4.1	5.1	5.3	5.9	6.4	7.1	8.4	10.5	10.9	12.5	12.9	13.6	10.5	8.9	7.4	5.7
1.3	1.8	1.5	1.1	.6	1.5	3.6	3.5	3.8	4.1	4.5	3.1	1.0	-1.3	-2.4	-2.0	-1.7	.0	1.4	1.3	2.9	2.1	3.3	3.4	4.2	5.9	7.4	9.5	9.7	9.7	9.3	7.9	6.3	4.9	3.6	2.5
-5.5	-5.0	-4.2	-4.1	-3.7	-3.1	-1.3	-.2	-1.4	-.8	-2.6	-4.5	-5.1	-5.4	-5.1	-4.3	-4.4	-1.8	-1.1	-2.3	-.9	-.7	.6	1.0	1.4	3.9	6.7	6.8	3.8	2.4	.7	-.8	-2.3	-3.2	-4.5	-4.5
-9.8	-9.1	-8.4	-7.9	-7.3	-7.1	-7.9	-6.1	-7.3	-8.0	-8.3	-8.8	-8.5	-8.1	-7.5	-7.0	-7.2	-5.8	-4.9	-5.0	-5.0	-6.9	-6.3	-6.7	-7.1	-7.0	-5.4	-5.5	-5.2	-6.4	-8.3	-9.4	-10.0	-9.8	-10.5	-9.7
-11.6	-11.3	-10.6	-10.3	-9.9	-9.9	-10.4	-10.7	-10.2	-10.5	-11.0	-11.1	-10.7	-10.2	-9.7	-9.8	-10.4	-10.1	-10.1	-10.0	-10.2	-11.0	-10.3	-10.8	-11.4	-11.0	-11.0	-11.1	-10.5	-11.4	-11.6	-12.1	-12.5	-12.1	-12.5	-12.0
-12.2	-12.3	-11.8	-11.6	-11.3	-11.2	-11.2	-10.9	-11.1	-11.2	-10.9	-11.3	-11.3	-11.3	-10.9	-10.9	-11.2	-11.0	-11.7	-10.9	-11.4	-10.8	-11.1	-11.4	-11.6	-11.7	-11.6	-11.7	-11.4	-11.7	-12.0	-12.0	-12.4	-12.4	-12.6	-12.8
-12.2	-12.7	-12.2	-12.0	-11.6	-11.3	-11.1	-10.9	-10.9	-10.9	-10.9	-11.5	-11.5	-11.5	-11.2	-11.1	-10.9	-10.9	-11.4	-10.6	-11.0	-10.7	-11.4	-11.4	-11.4	-11.6	-11.5	-11.6	-11.4	-11.4	-12.5	-12.1	-12.2	-12.6	-12.5	-13.0
-11.4	-12.0	-11.6	-11.3	-11.0	-10.6	-10.3	-10.0	-10.2	-10.6	-10.7	-11.2	-11.7	-11.0	-10.9	-10.8	-10.3	-10.8	-11.3	-11.2	-11.9	-11.2	-11.8	-11.2	-11.2	-11.5	-11.6	-11.6	-11.7	-12.4	-12.7	-12.5	-12.1	-12.0	-11.3	-12.0
-9.0	-9.2	-9.4	-9.1	-9.0	-8.7	-8.4	-8.2	-8.2	-8.5	-9.5	-10.2	-10.9	-9.8	-9.7	-9.7	-8.9	-9.6	-9.8	-10.6	-11.8	-10.8	-10.8	-10.1	-9.7	-9.6	-9.7	-9.7	-10.0	-11.3	-12.1	-11.5	-11.1	-10.1	-9.0	-9.4
-6.4	-5.8	-6.0	-5.6	-5.6	-5.6	-5.7	-5.8	-5.3	-5.1	-5.1	-6.5	-6.4	-6.0	-6.1	-6.6	-6.2	-6.7	-5.9	-6.4	-7.0	-7.4	-7.3	-7.1	-7.0	-6.9	-6.6	-6.2	-6.2	-6.7	-7.3	-7.8	-7.9	-7.6	-6.5	-6.4
-3.3	-2.5	-2.7	-2.3	-2.2	-2.3	-2.4	-2.5	-1.9	-1.2	-.8	-1.5	-1.6	-1.6	-1.9	-1.9	-1.8	-1.6	-.9	-1.0	-.9	-1.3	-1.5	-1.8	-2.2	-2.1	-1.8	-1.2	-1.0	-1.4	-1.9	-2.6	-3.1	-3.4	-3.1	-3.1
.1	.5	.8	.9	1.0	.8	.7	.6	.7	1.0	1.3	1.5	1.9	2.1	2.1	2.3	2.0	2.7	2.9	2.9	3.1	2.8	2.6	2.2	2.0	2.4	2.5	2.5	2.4	2.0	1.7	1.2	.9	.7	.3	.5
2.6	2.7	3.0	3.0	2.9	2.7	2.6	2.6	2.8	3.2	3.8	4.8	4.7	4.6	4.4	4.3	4.1	4.3	4.2	4.1	4.2	4.2	4.6	5.0	4.3	3.9	4.6	4.8	4.7	4.3	4.3	4.4	3.8	3.5	3.1	2.9
3.7	3.6	3.7	4.0	4.5	4.8	4.7	4.8	5.4	5.7	5.8	6.4	5.5	5.2	4.8	5.1	5.7	7.1	8.3	9.1	9.2	9.6	10.2	9.8	8.1	8.5	10.1	10.6	10.2	9.9	9.7	9.1	8.3	7.5	5.2	3.9
5.2	5.0	4.9	5.1	5.6	6.1	6.7	7.5	7.7	7.1	6.5	6.3	6.4	6.3	6.4	6.7	7.1	7.7	8.3	8.8	9.2	9.6	10.2	10.4	10.6	10.7	10.6	10.2	9.9	9.5	9.1	8.6	8.0	7.2	5.9	5.4

Figure 29. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS15 (700 hPa)
NOAA15, using all observations



2.9	2.8	2.9	2.9	2.9	2.9	3.0	3.1	3.3	3.4	3.1	3.3	3.2	3.3	2.9	2.7	2.7	2.8	3.0	3.2	3.2	3.1	3.2	3.2	3.1	3.0	3.0	2.9	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.9
2.9	3.0	3.0	2.8	2.5	2.4	2.6	2.6	2.8	3.0	3.1	3.5	4.3	3.5	3.5	3.8	3.8	3.8	3.6	4.2	4.3	4.3	4.1	3.8	3.7	3.5	3.3	3.2	3.0	2.8	2.6	2.3	2.3	2.4	2.6	2.7
3.5	3.4	3.5	3.5	3.3	3.5	3.8	3.8	3.6	3.3	3.0	3.3	3.6	4.1	5.2	4.9	4.4	4.1	4.1	4.0	4.1	3.7	3.3	3.3	3.2	3.3	4.0	4.2	4.0	3.8	3.5	2.7	1.9	2.3	2.9	3.6
2.8	3.1	3.0	2.9	3.5	3.7	3.7	3.8	3.9	3.5	3.5	3.7	3.5	3.5	3.9	4.0	3.8	3.7	3.8	2.7	3.3	3.0	3.0	3.0	3.4	3.6	4.0	4.2	4.1	3.6	3.2	2.8	2.8	2.6	3.0	2.9
3.9	3.9	3.5	3.4	3.4	3.7	3.6	3.7	3.7	3.8	4.2	4.4	4.3	4.2	3.7	3.4	3.4	3.5	3.7	3.6	3.1	3.1	3.0	3.2	3.5	3.3	3.0	3.2	3.2	3.2	3.3	4.0	3.6	3.6	3.8	4.0
4.0	3.8	3.6	3.5	3.7	3.9	4.6	4.2	4.1	4.1	4.5	4.0	3.9	3.8	3.5	3.4	3.5	3.6	3.5	3.7	4.0	4.0	3.6	3.1	3.9	5.5	3.4	3.1	3.7	3.7	4.3	4.6	4.8	4.5	4.1	4.3
3.5	3.4	3.4	3.4	3.5	3.5	3.8	3.9	3.7	3.6	3.6	3.6	3.7	3.6	3.5	3.5	3.3	3.6	3.5	3.7	4.0	4.0	3.6	3.9	4.4	3.8	5.1	4.9	3.8	3.9	3.7	3.6	3.6	3.6	3.2	3.6
3.4	3.4	3.4	3.3	3.4	3.4	3.5	3.5	3.6	3.4	3.4	3.3	3.5	3.5	3.5	3.5	3.4	3.7	3.4	3.6	3.6	3.4	3.3	3.4	3.4	3.4	3.4	3.4	3.2	3.3	3.2	3.3	3.3	3.4	3.2	3.5
3.4	3.2	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.2	3.3	3.4	3.3	3.4	3.4	3.3	3.5	3.2	3.6	3.2	3.4	3.3	3.3	3.4	3.3	3.4	3.3	3.3	3.3	3.2	3.4	3.3	3.3	3.3	3.2
3.5	3.3	3.3	3.3	3.3	3.3	3.3	3.2	3.2	3.2	3.3	3.4	3.5	3.4	3.5	3.3	3.3	3.3	3.2	3.6	3.1	3.3	3.4	3.4	3.4	3.3	3.4	3.4	3.3	3.4	3.4	3.3	3.9	3.3	3.4	3.3
3.5	3.3	3.3	3.4	3.4	3.4	3.3	3.3	3.2	3.2	3.1	3.5	3.4	3.4	3.4	3.3	3.4	3.2	3.1	3.7	3.3	3.3	3.4	3.4	3.4	3.3	3.3	3.2	3.2	3.4	3.4	3.4	3.5	3.4	3.5	3.3
3.4	3.5	3.4	3.5	3.4	3.6	3.4	3.4	3.4	3.3	3.2	3.8	3.5	3.4	3.4	3.3	3.5	3.2	3.3	3.5	3.7	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.4	3.8	4.0	4.0	4.0	3.5	3.5	3.3
3.4	3.6	3.4	3.7	3.5	3.3	3.3	3.2	3.3	3.4	3.6	4.1	3.9	3.7	3.5	3.4	3.6	3.5	3.7	3.4	3.6	3.9	3.8	3.5	3.4	3.5	3.5	3.4	3.6	3.9	4.0	4.1	4.0	3.3	3.3	3.4
3.3	3.5	3.5	3.4	3.3	3.2	3.3	3.3	3.3	3.3	3.8	3.6	3.5	3.6	3.4	3.6	3.5	3.6	3.5	3.2	3.5	3.6	3.8	3.7	3.8	3.9	3.8	3.6	3.6	3.5	3.4	3.4	3.5	3.3	3.4	3.6
2.9	3.0	2.8	2.7	2.8	2.7	2.7	2.9	2.9	2.7	2.6	2.7	2.8	2.9	3.2	3.2	2.8	2.8	2.7	2.5	2.6	2.7	2.7	2.9	3.0	2.6	2.5	2.7	2.6	2.5	2.6	2.6	2.7	2.9	2.9	2.7
2.1	2.2	2.0	2.0	1.9	2.0	2.1	2.2	2.3	2.3	2.3	2.4	2.1	2.0	2.0	2.1	2.2	2.3	2.4	2.2	2.3	2.3	2.5	2.9	2.6	2.2	2.5	2.7	2.8	2.7	2.9	3.0	2.6	2.3	2.3	2.2
1.6	1.6	1.7	1.7	1.9	2.0	1.9	2.1	2.1	2.1	2.0	2.0	1.8	1.7	1.7	1.9	2.1	2.3	2.6	2.7	2.9	2.5	1.9	1.6	2.2	2.2	1.7	1.5	1.4	1.3	1.2	1.2	1.3	1.5	1.9	1.6
2.3	2.2	2.2	2.2	2.0	1.9	1.7	1.5	1.4	1.4	1.7	1.8	1.9	1.9	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.4	1.4	1.5	1.5	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.2	1.6	2.3	2.4

Figure 30. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS11 (500 - 700 hPa)
NOAA15, using all observations



7.9	7.8	7.8	7.9	8.0	8.2	8.5	8.8	9.0	9.7	10.4	10.2	11.3	11.9	12.4	11.2	10.4	10.4	10.1	10.0	10.2	10.3	10.2	10.0	10.4	10.6	10.4	10.1	9.9	9.6	9.5	9.3	9.1	8.7	8.4	8.1
7.4	7.0	6.6	6.5	7.1	7.5	8.6	8.0	7.9	8.5	8.1	8.8	10.6	14.5	15.7	12.2	7.4	5.9	4.8	5.6	6.3	6.5	6.5	7.8	8.3	9.1	9.5	9.5	9.6	8.5	9.6	9.4	9.1	8.9	8.5	7.9
4.9	4.6	5.9	6.0	6.0	5.8	5.7	6.6	7.0	6.3	5.8	5.8	4.7	7.5	5.6	4.4	3.8	3.2	3.3	4.1	4.2	4.5	4.9	5.6	6.0	6.6	7.6	8.6	8.9	9.3	10.8	12.7	12.5	10.5	8.5	6.5
2.2	1.9	1.2	1.1	2.4	3.6	2.8	2.8	3.4	3.6	4.1	4.2	2.4	1.4	1.4	.6	.6	.5	.9	1.1	1.8	2.3	2.5	3.0	3.5	4.0	5.0	6.8	6.9	8.6	8.8	9.7	5.3	4.3	3.6	2.5
-.3	-.4	-.4	-.2	.3	1.1	1.8	.9	.8	1.5	1.7	.5	-.6	-1.3	-1.8	-1.5	-.6	-.4	-.5	-.7	-.2	-.4	.2	.0	.6	2.1	3.0	5.2	4.6	4.6	4.4	6.6	2.2	1.6	.8	.4
-4.4	-4.1	-3.2	-2.6	-2.3	-2.8	-3.1	-3.4	-4.3	-3.5	-4.0	-4.3	-4.2	-4.6	-3.6	-3.1	-3.3	-3.1	-3.3	-3.3	-2.4	-2.6	-2.4	-2.6	-1.9	2.0	4.2	4.1	.5	-1.6	-3.0	-3.5	-3.4	-3.0	-3.7	-3.4
-11.7	-9.8	-8.3	-8.5	-8.6	-8.2	-8.4	-8.0	-8.5	-9.0	-8.1	-7.3	-7.4	-7.2	-5.1	-5.2	-6.7	-7.7	-8.1	-7.9	-8.0	-9.5	-6.8	-7.0	-9.4	-9.7	-7.9	-7.6	-7.7	-8.3	-9.4	-10.2	-10.7	-12.1	-12.5	-11.4
-12.2	-11.4	-10.3	-9.2	-7.9	-6.0	-5.7	-7.9	-8.9	-7.8	-8.4	-9.6	-10.7	-9.8	-7.7	-6.1	-7.2	-9.3	-10.8	-10.7	-11.2	-12.0	-12.3	-13.6	-14.3	-13.4	-12.3	-10.8	-8.9	-9.0	-9.8	-10.7	-12.0	-13.8	-13.9	-13.2
-6.7	-6.7	-6.9	-6.7	-6.6	-7.9	-8.5	-8.2	-7.5	-6.1	-4.7	-6.7	-7.1	-6.3	-4.8	-4.1	-5.0	-6.1	-6.6	-6.7	-7.6	-8.6	-9.6	-8.6	-8.9	-7.9	-6.8	-5.5	-4.1	-2.9	-3.8	-4.4	-5.1	-5.4	-6.3	-6.9
-6.7	-9.6	-10.7	-11.9	-12.6	-12.9	-12.5	-12.1	-10.6	-7.3	-2.6	-3.0	-5.0	-7.3	-7.7	-8.3	-8.1	-6.6	-3.8	-1.6	-2.7	-5.4	-5.4	-4.3	-3.7	-4.4	-4.8	-4.3	-3.7	-2.3	-3.9	-3.8	-4.1	-4.5	-5.2	-6.5
-6.1	-6.1	-6.4	-6.8	-7.9	-10.6	-13.2	-13.6	-13.4	-11.4	-8.4	-5.9	-6.0	-7.3	-8.4	-10.6	-10.8	-10.7	-8.6	-4.8	-5.6	-6.0	-5.4	-7.4	-8.2	-10.5	-12.5	-12.0	-9.8	-8.0	-8.3	-6.7	-8.2	-8.2	-6.5	-7.2
-6.7	-7.7	-6.8	-4.7	-4.2	-5.1	-6.9	-8.9	-10.9	-13.2	-15.0	-9.7	-7.9	-7.1	-4.4	-5.4	-8.6	-11.3	-12.6	-10.3	-8.8	-8.8	-8.2	-6.4	-8.8	-10.8	-11.6	-12.2	-13.8	-13.4	-9.6	-7.2	-8.6	-8.3	-6.5	-7.4
-5.8	-6.3	-6.0	-5.2	-4.6	-3.5	-2.7	-3.9	-5.8	-6.2	-7.5	-6.2	-6.4	-6.4	-6.0	-5.5	-5.0	-5.5	-5.9	-7.1	-6.9	-6.0	-6.0	-6.1	-6.1	-6.1	-6.2	-6.4	-6.9	-8.0	-8.1	-7.3	-7.9	-7.2	-6.0	-6.3
-2.7	-1.9	-2.1	-1.6	-1.7	-1.8	-1.7	-1.8	-1.7	-1.4	-.8	-1.0	-1.4	-1.0	-1.6	-2.2	-2.0	-1.7	-1.1	-1.1	-.9	-1.2	-1.6	-1.7	-1.8	-1.7	-1.6	-1.5	-1.1	-1.2	-1.6	-2.3	-2.7	-3.2	-2.8	-2.9
-.2	.2	.6	.2	.1	.0	.3	.3	.2	.5	1.1	1.2	1.3	1.1	.7	1.1	.9	1.3	1.6	1.3	1.6	1.6	1.5	1.0	.8	1.0	1.3	1.6	1.5	1.2	1.2	.9	.5	.4	.1	.1
1.8	1.8	1.7	1.4	1.5	1.7	1.8	1.8	1.9	1.9	1.8	2.4	2.6	2.7	3.0	3.1	2.6	2.4	2.3	2.6	2.9	2.9	3.5	3.9	2.8	2.3	3.1	4.3	4.3	3.9	3.8	3.8	2.7	2.3	1.8	1.9
2.4	1.9	1.7	2.1	2.8	3.5	3.3	3.4	4.2	4.0	3.6	4.8	3.9	3.5	3.6	3.7	4.3	6.5	8.6	9.9	10.0	10.8	11.7	10.8	7.1	8.1	11.8	13.0	12.1	11.4	11.2	10.0	8.5	7.2	3.8	2.6
3.5	2.7	2.5	2.9	3.8	4.8	6.0	7.3	7.3	5.7	4.0	3.7	4.2	4.7	5.2	5.8	6.3	7.2	8.3	9.1	9.9	11.0	12.2	12.7	13.3	13.7	13.4	12.8	12.0	11.2	10.3	9.2	8.1	6.6	4.5	3.9

Figure 31. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS11 (500 - 700 hPa)
NOAA15, using all observations

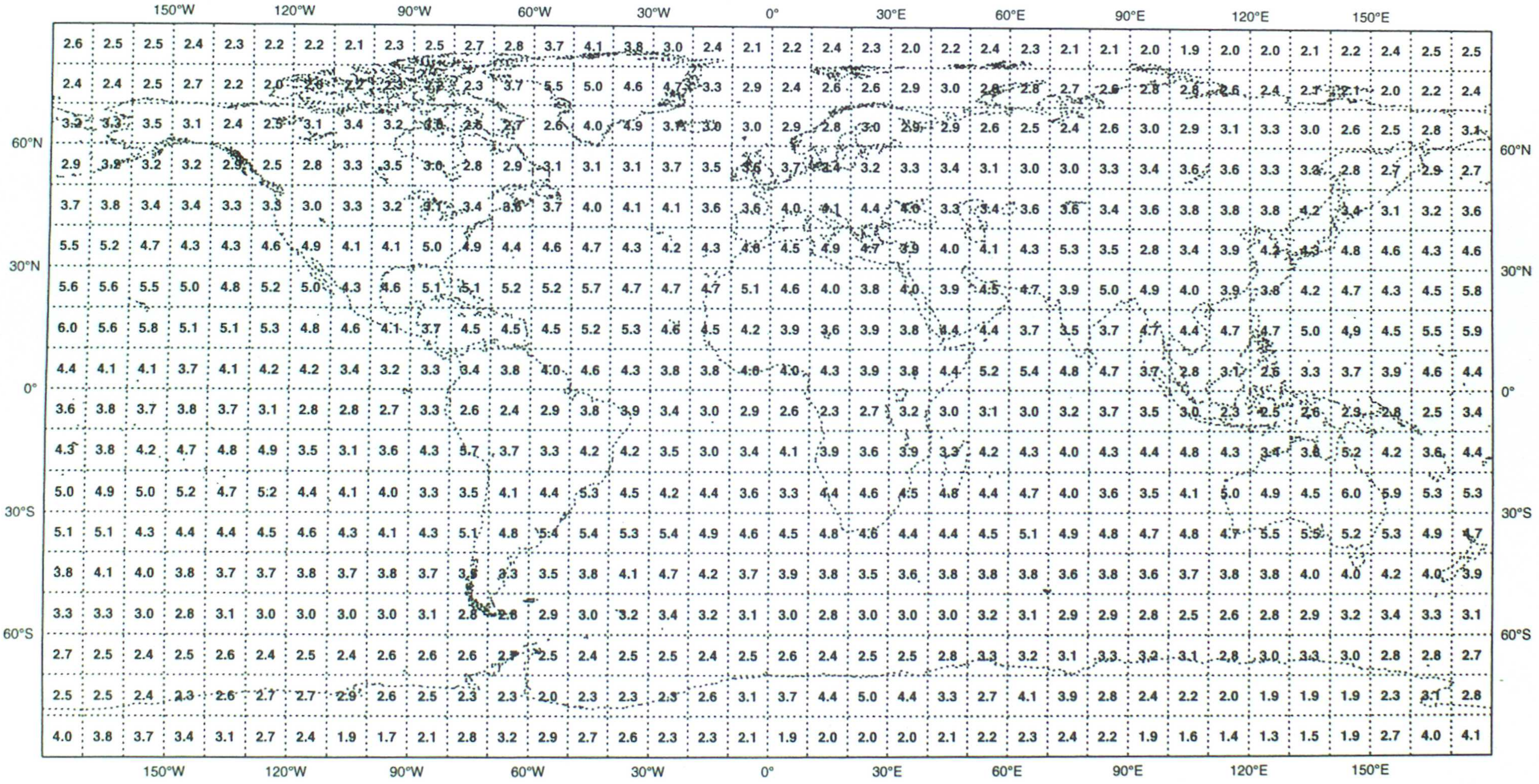
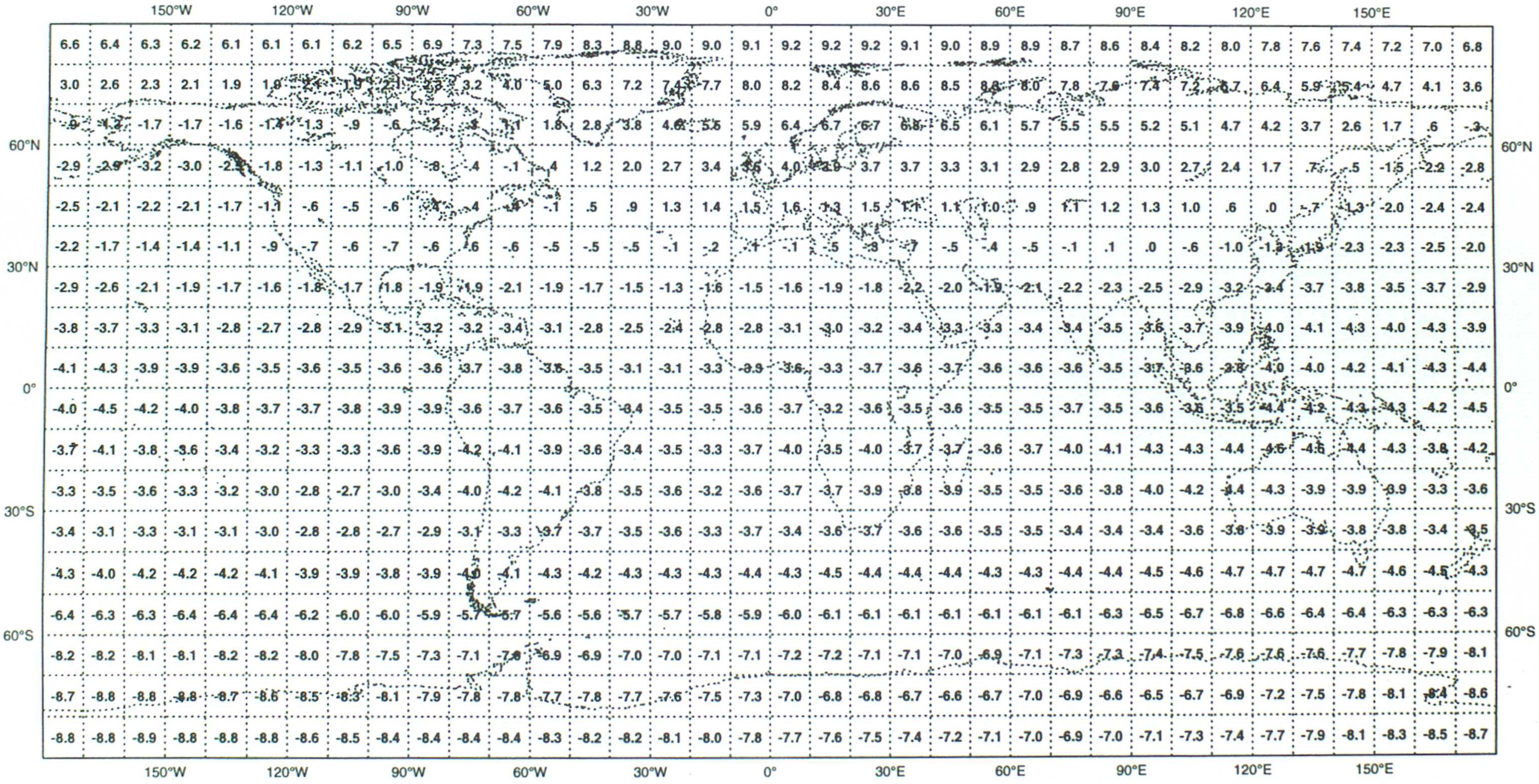

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N
30°N
0°
30°S
60°S
2.6 2.5 2.5 2.4 2.3 2.2 2.2 2.1 2.3 2.5 2.7 2.8 3.7 4.1 3.8 3.0 2.4 2.1 2.2 2.4 2.3 2.0 2.2 2.4 2.3 2.1 2.1 2.0 1.9 2.0 2.0 2.1 2.2 2.4 2.5 2.5
2.4 2.4 2.5 2.7 2.2 2.0 2.6 2.2 2.3 2.2 2.3 3.7 5.5 5.0 4.6 4.7 3.3 2.9 2.4 2.6 2.6 2.9 3.0 2.8 2.8 2.7 2.6 2.8 2.8 2.6 2.4 2.1 2.1 2.0 2.2 2.4
3.2 3.3 3.5 3.1 2.4 2.5 3.1 3.4 3.2 3.8 2.5 2.7 2.6 4.0 4.9 3.1 3.0 3.0 2.9 2.8 3.0 2.9 2.9 2.6 2.5 2.4 2.6 3.0 2.9 3.1 3.3 3.0 2.6 2.5 2.8 3.1
2.9 3.2 3.2 3.2 2.9 2.5 2.8 3.3 3.5 3.0 2.8 2.9 3.1 3.1 3.1 3.7 3.5 3.6 3.7 2.4 3.2 3.3 3.4 3.1 3.0 3.0 3.3 3.4 3.6 3.6 3.3 3.3 2.8 2.7 2.9 2.7
3.7 3.8 3.4 3.4 3.3 3.3 3.0 3.3 3.2 3.1 3.4 3.6 3.7 4.0 4.1 4.1 3.6 3.6 4.0 4.1 4.4 4.0 3.3 3.4 3.6 3.6 3.4 3.6 3.8 3.8 3.8 4.2 3.4 3.1 3.2 3.6
5.5 5.2 4.7 4.3 4.3 4.6 4.9 4.1 4.1 5.0 4.9 4.4 4.6 4.7 4.3 4.2 4.3 4.6 4.5 4.9 4.7 3.9 4.0 4.1 4.3 5.3 3.5 2.8 3.4 3.9 4.2 4.3 4.8 4.6 4.3 4.6
5.6 5.6 5.5 5.0 4.8 5.2 5.0 4.3 4.6 5.1 5.1 5.2 5.2 5.7 4.7 4.7 4.7 5.1 4.6 4.0 3.8 4.0 3.9 4.5 4.7 3.9 5.0 4.9 4.0 3.9 3.8 4.2 4.7 4.3 4.5 5.8
6.0 5.6 5.8 5.1 5.1 5.3 4.8 4.6 4.1 3.7 4.5 4.5 4.5 5.2 5.3 4.6 4.5 4.2 3.9 3.6 3.9 3.8 4.4 4.4 3.7 3.5 3.7 4.7 4.4 4.7 4.7 5.0 4.9 4.5 5.5 5.9
4.4 4.1 4.1 3.7 4.1 4.2 4.2 3.4 3.2 3.3 3.4 3.8 4.0 4.6 4.3 3.8 3.8 4.0 4.0 4.3 3.9 3.8 4.4 5.2 5.4 4.8 4.7 3.7 2.8 3.1 2.6 3.3 3.7 3.9 4.6 4.4
3.6 3.8 3.7 3.8 3.7 3.1 2.8 2.8 2.7 3.3 2.6 2.4 2.9 3.8 3.9 3.4 3.0 2.9 2.6 2.3 2.7 3.2 3.0 3.1 3.0 3.2 3.7 3.5 3.0 2.3 2.5 2.6 2.9 2.8 2.5 3.4
4.3 3.8 4.2 4.7 4.8 4.9 3.5 3.1 3.6 4.3 5.7 3.7 3.3 4.2 4.2 3.5 3.0 3.4 4.1 3.9 3.6 3.9 3.3 4.2 4.3 4.0 4.3 4.4 4.8 4.3 3.4 3.8 5.2 4.2 3.6 4.4
5.0 4.9 5.0 5.2 4.7 5.2 4.4 4.1 4.0 3.3 3.5 4.1 4.4 5.3 4.5 4.2 4.4 3.6 3.3 4.4 4.6 4.5 4.8 4.4 4.7 4.0 3.6 3.5 4.1 5.0 4.9 4.5 6.0 5.9 5.3 5.3
5.1 5.1 4.3 4.4 4.4 4.5 4.6 4.3 4.1 4.3 5.1 4.8 5.4 5.4 5.3 5.4 4.9 4.6 4.5 4.8 4.6 4.4 4.4 4.5 5.1 4.9 4.8 4.7 4.8 4.7 5.5 5.5 5.2 5.3 4.9 4.7
3.8 4.1 4.0 3.8 3.7 3.7 3.8 3.7 3.8 3.7 3.5 3.3 3.5 3.8 4.1 4.7 4.2 3.7 3.9 3.8 3.5 3.6 3.8 3.8 3.8 3.6 3.8 3.6 3.7 3.8 3.8 4.0 4.0 4.2 4.0 3.9
3.3 3.3 3.0 2.8 3.1 3.0 3.0 3.0 3.0 3.1 2.8 2.8 2.9 3.0 3.2 3.4 3.2 3.1 3.0 2.8 3.0 3.0 3.0 3.2 3.1 2.9 2.9 2.8 2.5 2.6 2.8 2.9 3.2 3.4 3.3 3.1
2.7 2.5 2.4 2.5 2.6 2.4 2.5 2.4 2.6 2.6 2.6 2.7 2.5 2.4 2.5 2.5 2.4 2.5 2.6 2.4 2.5 2.5 2.8 3.3 3.2 3.1 3.3 3.2 3.1 2.8 3.0 3.3 3.0 2.8 2.8 2.7
2.5 2.5 2.4 2.3 2.6 2.7 2.7 2.9 2.6 2.5 2.3 2.3 2.0 2.3 2.3 2.3 2.6 3.1 3.7 4.4 5.0 4.4 3.3 2.7 4.1 3.9 2.8 2.4 2.2 2.0 1.9 1.9 1.9 2.3 3.1 2.8
4.0 3.8 3.7 3.4 3.1 2.7 2.4 1.9 1.7 2.1 2.8 3.2 2.9 2.7 2.6 2.3 2.3 2.1 1.9 2.0 2.0 2.0 2.1 2.2 2.3 2.4 2.2 1.9 1.6 1.4 1.3 1.5 1.9 2.7 4.0 4.1

Figure 32. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS4 (400 hPa)
NOAA15, using all observations



6.6	6.4	6.3	6.2	6.1	6.1	6.1	6.2	6.5	6.9	7.3	7.5	7.9	8.3	8.8	9.0	9.0	9.1	9.2	9.2	9.2	9.1	9.0	8.9	8.9	8.7	8.6	8.4	8.2	8.0	7.8	7.6	7.4	7.2	7.0	6.8
3.0	2.6	2.3	2.1	1.9	1.9	2.1	1.9	2.1	2.3	3.2	4.0	5.0	6.3	7.2	7.4	7.7	8.0	8.2	8.4	8.6	8.6	8.5	8.3	8.0	7.8	7.6	7.4	7.2	6.7	6.4	5.9	5.4	4.7	4.1	3.6
-.9	-1.2	-1.7	-1.7	-1.6	-1.4	-1.3	-.9	-.6	-.2	-.3	1.1	1.8	2.8	3.8	4.6	5.5	5.9	6.4	6.7	6.7	6.8	6.5	6.1	5.7	5.5	5.5	5.2	5.1	4.7	4.2	3.7	2.6	1.7	.6	-.3
-2.9	-2.9	-3.2	-3.0	-2.5	-1.8	-1.3	-1.1	-1.0	-.8	-.4	-.1	.4	1.2	2.0	2.7	3.4	3.6	4.0	3.9	3.7	3.7	3.3	3.1	2.9	2.8	2.9	3.0	2.7	2.4	1.7	.7	-.5	-1.5	-2.2	-2.8
-2.5	-2.1	-2.2	-2.1	-1.7	-1.1	-.6	-.5	-.6	-.4	-.4	-.4	-.1	.5	.9	1.3	1.4	1.5	1.6	1.3	1.5	1.1	1.1	1.0	.9	1.1	1.2	1.3	1.0	.6	.0	-.7	-1.3	-2.0	-2.4	-2.4
-2.2	-1.7	-1.4	-1.4	-1.1	-.9	-.7	-.6	-.7	-.6	.6	-.6	-.5	-.5	-.5	-.1	-.2	-.1	-.1	-.5	-.8	-.7	-.5	-.4	-.5	-.1	.1	.0	-.6	-1.0	-1.3	-1.9	-2.3	-2.3	-2.5	-2.0
-2.9	-2.6	-2.1	-1.9	-1.7	-1.6	-1.8	-1.7	-1.8	-1.9	-1.9	-2.1	-1.9	-1.7	-1.5	-1.3	-1.6	-1.5	-1.6	-1.9	-1.8	-2.2	-2.0	-1.9	-2.1	-2.2	-2.3	-2.5	-2.9	-3.2	-3.4	-3.7	-3.8	-3.5	-3.7	-2.9
-3.8	-3.7	-3.3	-3.1	-2.8	-2.7	-2.8	-2.9	-3.1	-3.2	-3.2	-3.4	-3.1	-2.8	-2.5	-2.4	-2.8	-2.8	-3.1	-3.0	-3.2	-3.4	-3.3	-3.3	-3.4	-3.4	-3.5	-3.6	-3.7	-3.9	-4.0	-4.1	-4.3	-4.0	-4.3	-3.9
-4.1	-4.3	-3.9	-3.9	-3.6	-3.5	-3.6	-3.5	-3.6	-3.6	-3.7	-3.8	-3.6	-3.5	-3.1	-3.1	-3.3	-3.9	-3.6	-3.3	-3.7	-3.6	-3.7	-3.6	-3.6	-3.6	-3.5	-3.7	-3.6	-3.8	-4.0	-4.0	-4.2	-4.1	-4.3	-4.4
-4.0	-4.5	-4.2	-4.0	-3.8	-3.7	-3.7	-3.8	-3.9	-3.9	-3.6	-3.7	-3.6	-3.5	-3.4	-3.5	-3.5	-3.6	-3.7	-3.2	-3.6	-3.5	-3.6	-3.5	-3.5	-3.7	-3.5	-3.6	-3.6	-3.5	-4.4	-4.2	-4.3	-4.3	-4.2	-4.5
-3.7	-4.1	-3.8	-3.6	-3.4	-3.2	-3.3	-3.3	-3.6	-3.9	-4.2	-4.1	-3.9	-3.6	-3.4	-3.5	-3.3	-3.7	-4.0	-3.5	-4.0	-3.7	-3.7	-3.6	-3.7	-4.0	-4.1	-4.3	-4.3	-4.4	-4.6	-4.6	-4.4	-4.3	-3.8	-4.2
-3.3	-3.5	-3.6	-3.3	-3.2	-3.0	-2.8	-2.7	-3.0	-3.4	-4.0	-4.2	-4.1	-3.8	-3.5	-3.6	-3.2	-3.6	-3.7	-3.7	-3.9	-3.8	-3.9	-3.5	-3.5	-3.6	-3.8	-4.0	-4.2	-4.4	-4.3	-3.9	-3.9	-3.9	-3.3	-3.6
-3.4	-3.1	-3.3	-3.1	-3.1	-3.0	-2.8	-2.8	-2.7	-2.9	-3.1	-3.3	-3.7	-3.7	-3.5	-3.6	-3.3	-3.7	-3.4	-3.6	-3.7	-3.6	-3.6	-3.5	-3.5	-3.4	-3.4	-3.4	-3.6	-3.8	-3.9	-3.9	-3.8	-3.8	-3.4	-3.5
-4.3	-4.0	-4.2	-4.2	-4.2	-4.1	-3.9	-3.9	-3.8	-3.9	-4.0	-4.1	-4.3	-4.2	-4.3	-4.3	-4.3	-4.4	-4.3	-4.5	-4.4	-4.4	-4.4	-4.3	-4.3	-4.4	-4.4	-4.5	-4.6	-4.7	-4.7	-4.7	-4.7	-4.6	-4.5	-4.3
-6.4	-6.3	-6.3	-6.4	-6.4	-6.4	-6.2	-6.0	-6.0	-5.9	-5.7	-5.7	-5.6	-5.6	-5.7	-5.7	-5.8	-5.9	-6.0	-6.1	-6.1	-6.1	-6.1	-6.1	-6.1	-6.1	-6.3	-6.5	-6.7	-6.8	-6.6	-6.4	-6.4	-6.3	-6.3	-6.3
-8.2	-8.2	-8.1	-8.1	-8.2	-8.2	-8.0	-7.8	-7.5	-7.3	-7.1	-7.6	-6.9	-6.9	-7.0	-7.0	-7.1	-7.1	-7.2	-7.2	-7.1	-7.1	-7.0	-6.9	-7.1	-7.3	-7.3	-7.4	-7.5	-7.6	-7.6	-7.6	-7.7	-7.8	-7.9	-8.1
-8.7	-8.8	-8.8	-8.8	-8.7	-8.6	-8.5	-8.3	-8.1	-7.9	-7.8	-7.8	-7.7	-7.8	-7.7	-7.6	-7.5	-7.3	-7.0	-6.8	-6.8	-6.7	-6.6	-6.7	-7.0	-6.9	-6.6	-6.5	-6.7	-6.9	-7.2	-7.5	-7.8	-8.1	-8.4	-8.6
-8.8	-8.8	-8.9	-8.8	-8.8	-8.8	-8.6	-8.5	-8.4	-8.4	-8.4	-8.4	-8.3	-8.2	-8.2	-8.1	-8.0	-7.8	-7.7	-7.6	-7.5	-7.4	-7.2	-7.1	-7.0	-6.9	-7.0	-7.1	-7.3	-7.4	-7.7	-7.9	-8.1	-8.3	-8.5	-8.7

Figure 33. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS4 (400 hPa)
NOAA15, using all observations

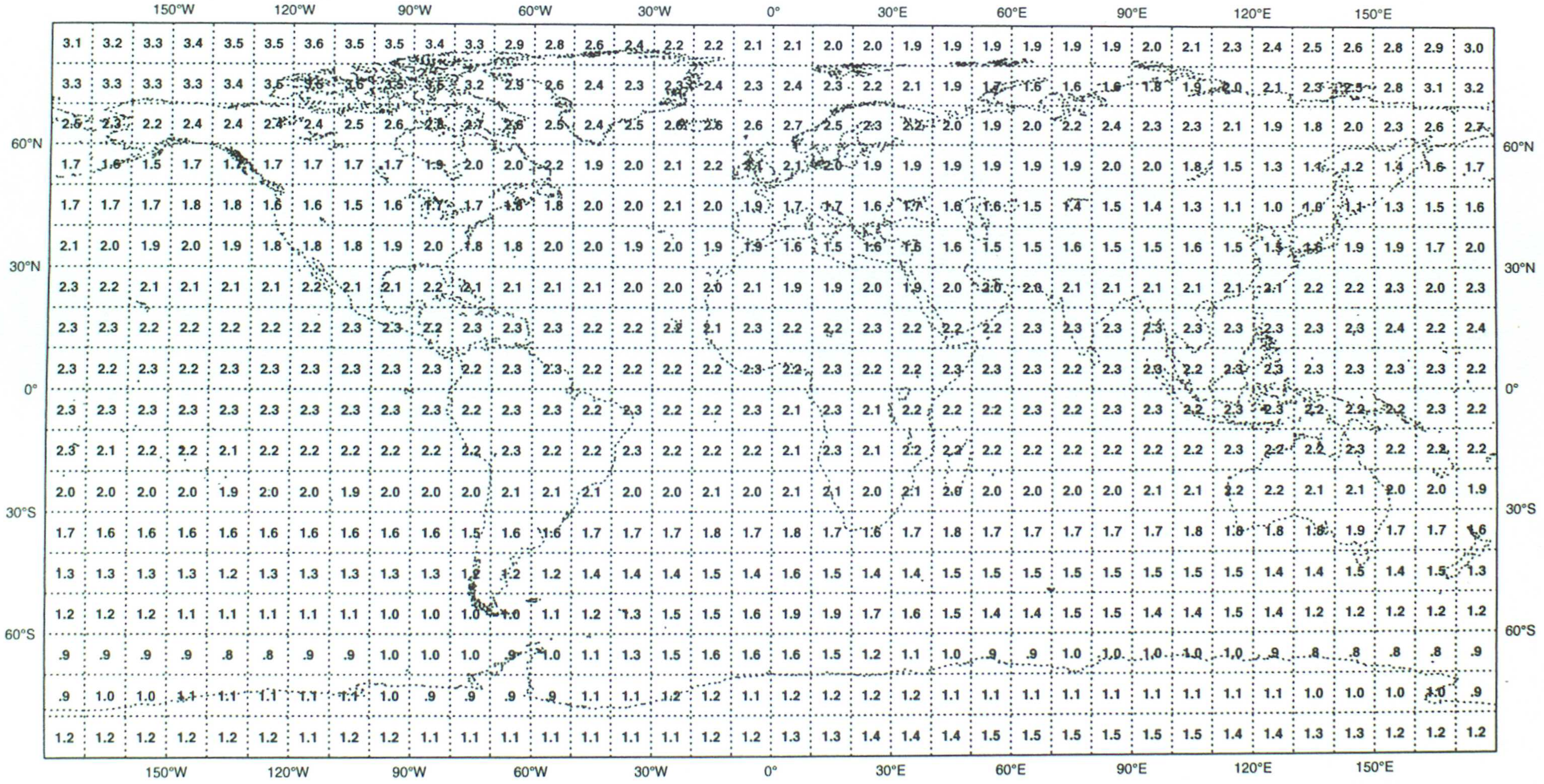
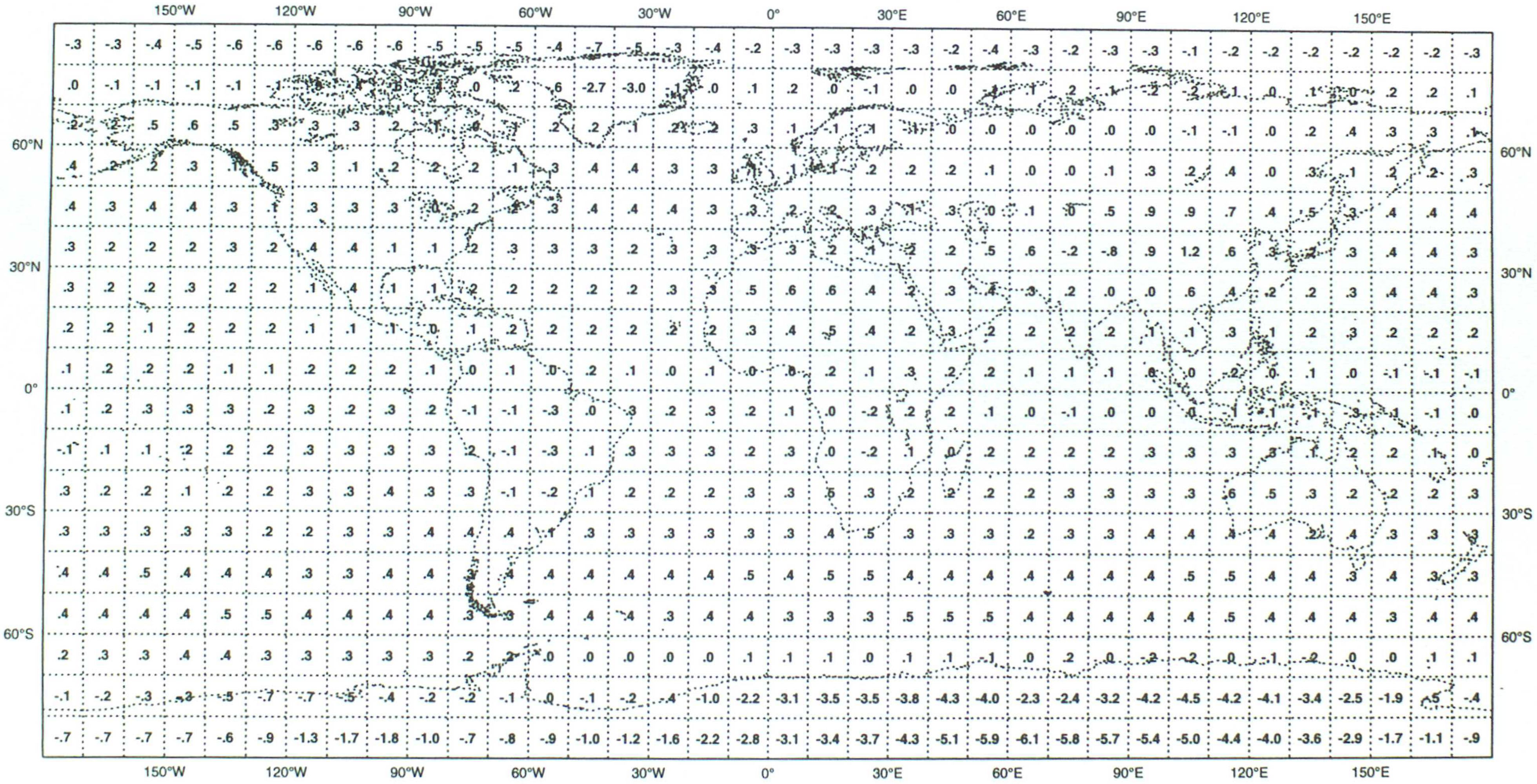

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N
30°N
0°
30°S
60°S
3.1 3.2 3.3 3.4 3.5 3.5 3.6 3.5 3.5 3.4 3.3 2.9 2.8 2.6 2.4 2.2 2.2 2.1 2.1 2.0 2.0 1.9 1.9 1.9 1.9 1.9 1.9 2.0 2.1 2.3 2.4 2.5 2.6 2.8 2.9 3.0
3.3 3.3 3.3 3.3 3.4 3.5 3.6 3.6 3.5 3.5 3.2 2.9 2.6 2.4 2.3 2.3 2.4 2.3 2.4 2.3 2.2 2.1 1.9 1.7 1.6 1.6 1.6 1.8 1.9 2.0 2.1 2.3 2.5 2.8 3.1 3.2
2.6 2.3 2.2 2.4 2.4 2.4 2.4 2.5 2.6 2.8 2.7 2.6 2.5 2.4 2.5 2.6 2.6 2.6 2.7 2.5 2.3 2.2 2.0 1.9 2.0 2.2 2.4 2.3 2.3 2.1 1.9 1.8 2.0 2.3 2.6 2.7
1.7 1.6 1.5 1.7 1.7 1.7 1.7 1.7 1.7 1.9 2.0 2.0 2.2 1.9 2.0 2.1 2.2 2.1 2.1 2.0 1.9 1.9 1.9 1.9 1.9 1.9 2.0 2.0 1.8 1.5 1.3 1.4 1.2 1.4 1.6 1.7
1.7 1.7 1.7 1.8 1.8 1.6 1.6 1.5 1.6 1.7 1.7 1.8 1.8 2.0 2.0 2.1 2.0 1.9 1.7 1.7 1.6 1.7 1.6 1.6 1.5 1.4 1.5 1.4 1.3 1.1 1.0 1.0 1.1 1.3 1.5 1.6
2.1 2.0 1.9 2.0 1.9 1.8 1.8 1.8 1.9 2.0 1.8 1.8 2.0 2.0 1.9 2.0 1.9 1.9 1.6 1.5 1.6 1.6 1.6 1.5 1.5 1.6 1.5 1.5 1.6 1.5 1.5 1.6 1.9 1.9 1.7 2.0
2.3 2.2 2.1 2.1 2.1 2.1 2.2 2.1 2.1 2.2 2.1 2.1 2.1 2.1 2.0 2.0 2.0 2.1 1.9 1.9 2.0 1.9 2.0 2.0 2.0 2.1 2.1 2.1 2.1 2.1 2.1 2.2 2.2 2.3 2.0 2.3
2.3 2.3 2.2 2.2 2.2 2.2 2.2 2.3 2.3 2.2 2.3 2.3 2.3 2.2 2.2 2.2 2.1 2.3 2.2 2.2 2.3 2.2 2.2 2.2 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.4 2.2 2.4
2.3 2.2 2.3 2.2 2.3 2.3 2.3 2.3 2.3 2.3 2.2 2.3 2.3 2.2 2.2 2.2 2.2 2.3 2.2 2.3 2.2 2.2 2.3 2.3 2.3 2.2 2.3 2.3 2.2 2.3 2.3 2.3 2.3 2.3 2.3 2.2
2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.2 2.3 2.3 2.2 2.3 2.2 2.2 2.3 2.1 2.3 2.1 2.2 2.2 2.2 2.3 2.2 2.3 2.3 2.2 2.3 2.3 2.2 2.2 2.2 2.3 2.2
2.3 2.1 2.2 2.2 2.1 2.2 2.2 2.2 2.2 2.2 2.2 2.3 2.2 2.2 2.3 2.2 2.2 2.2 2.1 2.3 2.1 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.3 2.2 2.2 2.3 2.2 2.2 2.2
2.0 2.0 2.0 2.0 1.9 2.0 2.0 1.9 2.0 2.0 2.0 2.1 2.1 2.1 2.0 2.0 2.1 2.0 2.1 2.1 2.0 2.1 2.0 2.0 2.0 2.0 2.0 2.1 2.1 2.2 2.2 2.1 2.1 2.0 2.0 1.9
1.7 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.5 1.6 1.6 1.7 1.7 1.7 1.8 1.7 1.8 1.7 1.6 1.7 1.8 1.7 1.7 1.7 1.7 1.7 1.8 1.8 1.8 1.8 1.9 1.7 1.7 1.6
1.3 1.3 1.3 1.3 1.2 1.3 1.3 1.3 1.3 1.3 1.2 1.2 1.2 1.4 1.4 1.4 1.5 1.4 1.6 1.5 1.4 1.4 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.4 1.4 1.5 1.4 1.5 1.3
1.2 1.2 1.2 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 1.1 1.2 1.3 1.5 1.5 1.6 1.9 1.9 1.7 1.6 1.5 1.4 1.4 1.5 1.5 1.4 1.4 1.5 1.4 1.2 1.2 1.2 1.2 1.2
.9 .9 .9 .9 .8 .8 .9 .9 1.0 1.0 1.0 .9 1.0 1.1 1.3 1.5 1.6 1.6 1.6 1.5 1.2 1.1 1.0 .9 .9 1.0 1.0 1.0 1.0 1.0 .9 .8 .8 .8 .8 .9
.9 1.0 1.0 1.1 1.1 1.1 1.1 1.1 1.0 .9 .9 .9 .9 1.1 1.1 1.2 1.2 1.1 1.2 1.2 1.2 1.2 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 .9
1.2 1.2 1.2 1.2 1.2 1.2 1.1 1.2 1.2 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.2 1.2 1.3 1.3 1.4 1.4 1.4 1.5 1.5 1.5 1.5 1.5 1.5 1.4 1.4 1.3 1.3 1.2 1.2 1.2

Figure 34. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-5 (700 hPa)
NOAA15, using all observations



-.3	-.3	-.4	-.5	-.6	-.6	-.6	-.6	-.6	-.5	-.5	-.5	-.4	-.7	-.5	-.3	-.4	-.2	-.3	-.3	-.3	-.3	-.2	-.4	-.3	-.2	-.3	-.3	-.1	-.2	-.2	-.2	-.2	-.2	-.2	-.3
.0	-.1	-.1	-.1	-.1	-.1	.3	.4	.5	.4	.0	.2	.6	-2.7	-3.0	-.1	.0	.1	.2	.0	-.1	.0	.0	-.1	.1	.2	-.1	-.2	-.2	.1	.0	.1	.0	.2	.2	.1
.2	.2	.5	.6	.5	.3	.3	.3	.2	.1	.0	.1	.2	.2	.1	.2	.2	.3	.1	-.1	-.1	-.1	.0	.0	.0	.0	.0	.0	-.1	-.1	.0	.2	.4	.3	.3	.1
.4	.2	.2	.3	.1	.5	.3	.1	.2	.2	.2	.1	.3	.4	.4	.3	.3	.1	.1	.1	.2	.2	.2	.1	.0	.0	.1	.3	.2	.4	.0	.3	.1	.2	.2	.3
.4	.3	.4	.4	.3	.1	.3	.3	.3	.0	.2	.2	.3	.4	.4	.4	.3	.3	.2	.2	.3	.1	.3	.0	.1	.0	.5	.9	.9	.7	.4	.5	.3	.4	.4	.4
.3	.2	.2	.2	.3	.2	.4	.4	.1	.1	.2	.3	.3	.3	.2	.3	.3	.3	.3	.2	.1	.2	.2	.5	.6	-.2	-.8	.9	1.2	.6	.3	.2	.3	.4	.4	.3
.3	.2	.2	.3	.2	.2	.1	.4	.1	.1	.2	.2	.2	.2	.2	.3	.3	.5	.6	.6	.4	.2	.3	.4	.3	.2	.0	.0	.6	.4	.2	.2	.3	.4	.4	.3
.2	.2	.1	.2	.2	.2	.1	.1	.1	.0	.1	.2	.2	.2	.2	.2	.2	.3	.4	.5	.4	.2	.3	.2	.2	.2	.2	.1	.1	.3	.1	.2	.3	.2	.2	.2
.1	.2	.2	.2	.1	.1	.2	.2	.2	.1	.0	.1	.0	.2	.1	.0	.1	.0	.0	.2	.1	.3	.2	.2	.1	.1	.1	.0	.0	-.2	.0	.1	.0	-.1	-.1	-.1
.1	.2	.3	.3	.3	.2	.3	.2	.3	.2	-.1	-.1	-.3	.0	.3	.2	.3	.2	.1	.0	-.2	.2	.2	.1	.0	-.1	.0	.0	.0	-.1	.1	-.1	-.3	-.1	-.1	.0
-.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.2	-.1	-.3	.1	.3	.3	.3	.2	.3	.0	-.2	.1	.0	.2	.2	.2	.2	.3	.3	.3	.3	.1	.2	.2	.1	.0
.3	.2	.2	.1	.2	.2	.3	.3	.4	.3	.3	-.1	-.2	.1	.2	.2	.2	.3	.3	.5	.3	.2	.2	.2	.2	.3	.3	.3	.3	.6	.5	.3	.2	.2	.2	.3
.3	.3	.3	.3	.3	.2	.2	.3	.3	.4	.4	.4	.1	.3	.3	.3	.3	.3	.3	.4	.5	.3	.3	.3	.2	.3	.3	.4	.4	.4	.4	.2	.4	.3	.3	.3
.4	.4	.5	.4	.4	.4	.3	.3	.4	.4	.3	.4	.4	.4	.4	.4	.4	.5	.4	.5	.5	.4	.4	.4	.4	.4	.4	.4	.5	.5	.4	.4	.3	.4	.3	.3
.4	.4	.4	.4	.5	.5	.4	.4	.4	.4	.3	.3	.4	.4	.4	.3	.4	.4	.3	.3	.3	.5	.5	.5	.4	.4	.4	.4	.4	.5	.4	.4	.4	.3	.4	.4
.2	.3	.3	.4	.4	.3	.3	.3	.3	.3	.2	.2	.0	.0	.0	.0	.0	.1	.1	.1	.0	.1	.1	-.1	.0	.2	.0	-.2	-.2	.0	-.1	-.2	.0	.0	.1	.1
-.1	-.2	-.3	-.3	-.5	-.7	-.7	-.5	-.4	-.2	-.2	-.1	.0	-.1	-.2	-.4	-1.0	-2.2	-3.1	-3.5	-3.5	-3.8	-4.3	-4.0	-2.3	-2.4	-3.2	-4.2	-4.5	-4.2	-4.1	-3.4	-2.5	-1.9	-.5	-.4
-.7	-.7	-.7	-.7	-.6	-.9	-1.3	-1.7	-1.8	-1.0	-.7	-.8	-.9	-1.0	-1.2	-1.6	-2.2	-2.8	-3.1	-3.4	-3.7	-4.3	-5.1	-5.9	-6.1	-5.8	-5.7	-5.4	-5.0	-4.4	-4.0	-3.6	-2.9	-1.7	-1.1	-.9

Figure 35. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-5 (700 hPa)
NOAA15, using all observations

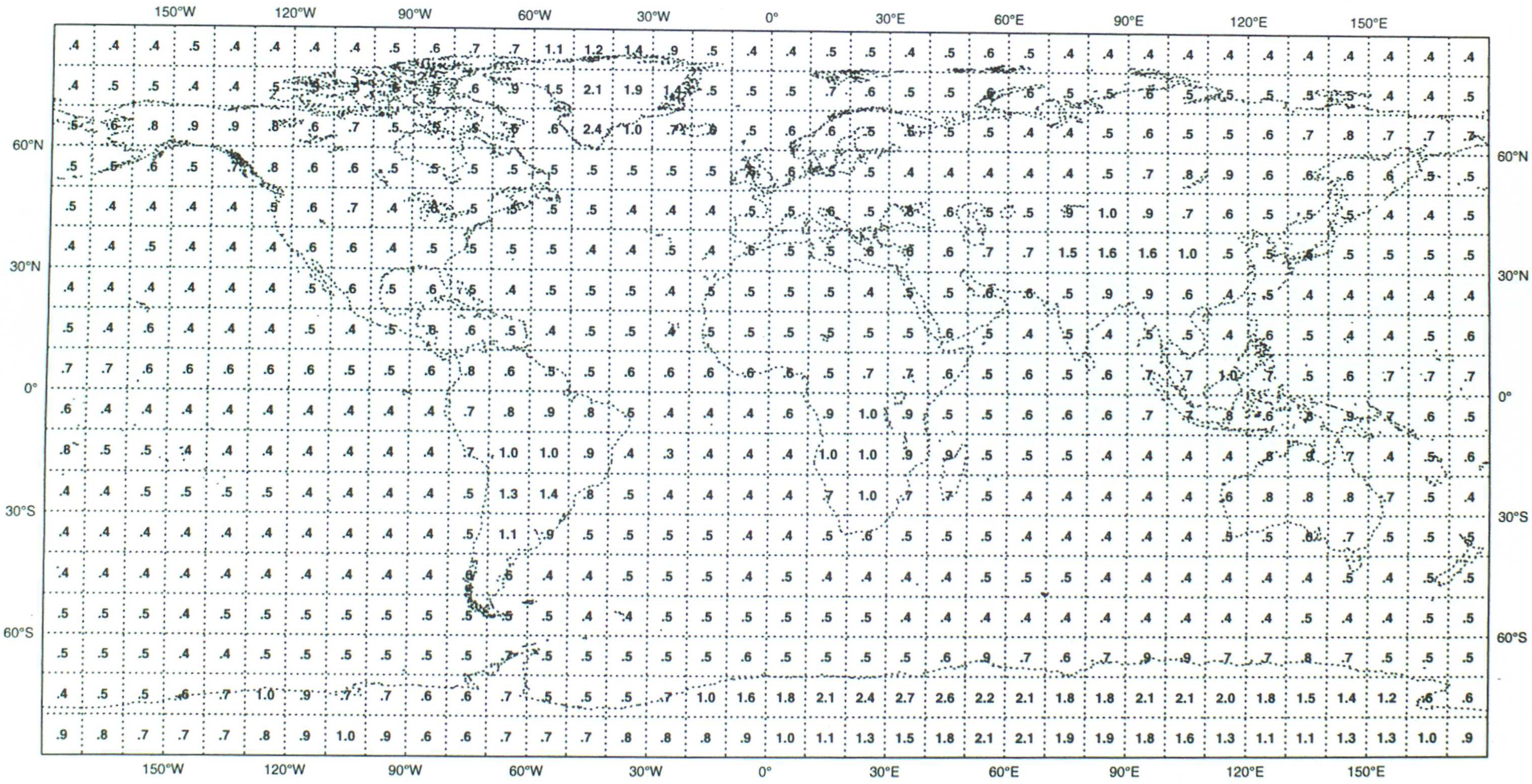

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
.4 .4 .4 .5 .4 .4 .4 .4 .5 .6 .7 .7 1.1 1.2 1.4 .9 .5 .4 .4 .5 .5 .4 .5 .6 .5 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4
.4 .5 .5 .4 .4 .5 .5 .5 .5 .5 .6 .9 1.5 2.1 1.9 1.4 .5 .5 .5 .7 .6 .5 .5 .6 .6 .5 .5 .6 .5 .5 .5 .5 .5 .4 .4 .5
.5 .6 .8 .9 .9 .8 .6 .7 .5 .5 .6 .6 .6 2.4 1.0 .7 .9 .5 .6 .6 .5 .5 .5 .5 .4 .4 .5 .6 .5 .5 .6 .7 .8 .7 .7 .7
.5 .5 .6 .5 .7 .8 .6 .6 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .6 .5 .5 .4 .4 .4 .4 .4 .5 .7 .8 .9 .6 .6 .6 .6 .5 .5
.5 .4 .4 .4 .4 .5 .6 .7 .4 .6 .5 .5 .5 .5 .4 .4 .4 .5 .5 .6 .5 .6 .6 .5 .5 .9 1.0 .9 .7 .6 .5 .5 .5 .4 .4 .5
.4 .4 .5 .4 .4 .4 .6 .6 .4 .5 .5 .5 .5 .4 .4 .5 .4 .6 .5 .5 .6 .6 .6 .7 .7 1.5 1.6 1.6 1.0 .5 .5 .4 .5 .5 .5 .5
.4 .4 .4 .4 .4 .4 .5 .6 .5 .6 .5 .4 .5 .5 .5 .4 .5 .5 .5 .5 .4 .5 .5 .6 .6 .5 .9 .9 .6 .4 .5 .4 .4 .4 .4 .4
.5 .4 .6 .4 .4 .4 .5 .4 .5 .8 .6 .5 .4 .5 .5 .4 .5 .5 .5 .5 .5 .5 .6 .5 .4 .5 .4 .5 .5 .4 .6 .5 .4 .4 .5 .6
.7 .7 .6 .6 .6 .6 .6 .5 .5 .6 .8 .6 .5 .5 .6 .6 .6 .6 .6 .5 .7 .7 .6 .5 .6 .5 .6 .7 .7 1.0 .7 .5 .6 .7 .7 .7
.6 .4 .4 .4 .4 .4 .4 .4 .4 .4 .7 .8 .9 .8 .5 .4 .4 .4 .6 .9 1.0 .9 .5 .5 .6 .6 .6 .7 .7 .8 .6 .8 .9 .7 .6 .5
.8 .5 .5 .4 .4 .4 .4 .4 .4 .4 .7 1.0 1.0 .9 .4 .3 .4 .4 .4 1.0 1.0 .9 .9 .5 .5 .5 .4 .4 .4 .4 .8 .9 .7 .4 .5 .6
.4 .4 .5 .5 .5 .5 .4 .4 .4 .4 .5 1.3 1.4 .8 .5 .4 .4 .4 .4 .7 1.0 .7 .7 .5 .4 .4 .4 .4 .4 .6 .8 .8 .8 .7 .5 .4
.4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .5 1.1 .9 .5 .5 .5 .5 .4 .4 .5 .6 .5 .5 .5 .4 .4 .4 .4 .4 .5 .5 .6 .7 .5 .5 .5
.4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .6 .6 .4 .4 .5 .5 .5 .4 .5 .4 .4 .4 .4 .5 .5 .5 .4 .4 .4 .4 .4 .4 .5 .4 .5 .5
.5 .5 .5 .4 .5 .5 .5 .5 .5 .5 .5 .5 .5 .4 .4 .5 .5 .5 .5 .5 .5 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .5 .4 .4 .5 .5
.5 .5 .5 .4 .4 .5 .5 .5 .5 .5 .5 .7 .5 .5 .5 .5 .5 .6 .5 .5 .5 .5 .6 .9 .7 .6 .7 .9 .9 .7 .7 .8 .7 .5 .5 .5
.4 .5 .5 .6 .7 1.0 .9 .7 .7 .6 .6 .7 .5 .5 .5 .7 1.0 1.6 1.8 2.1 2.4 2.7 2.6 2.2 2.1 1.8 1.8 2.1 2.1 2.0 1.8 1.5 1.4 1.2 .6 .6
.9 .8 .7 .7 .7 .8 .9 1.0 .9 .6 .6 .7 .7 .7 .8 .8 .8 .9 1.0 1.1 1.3 1.5 1.8 2.1 2.1 1.9 1.9 1.8 1.6 1.3 1.1 1.1 1.3 1.3 1.0 .9

Figure 36. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-7 (300 hPa)
NOAA15, using all observations

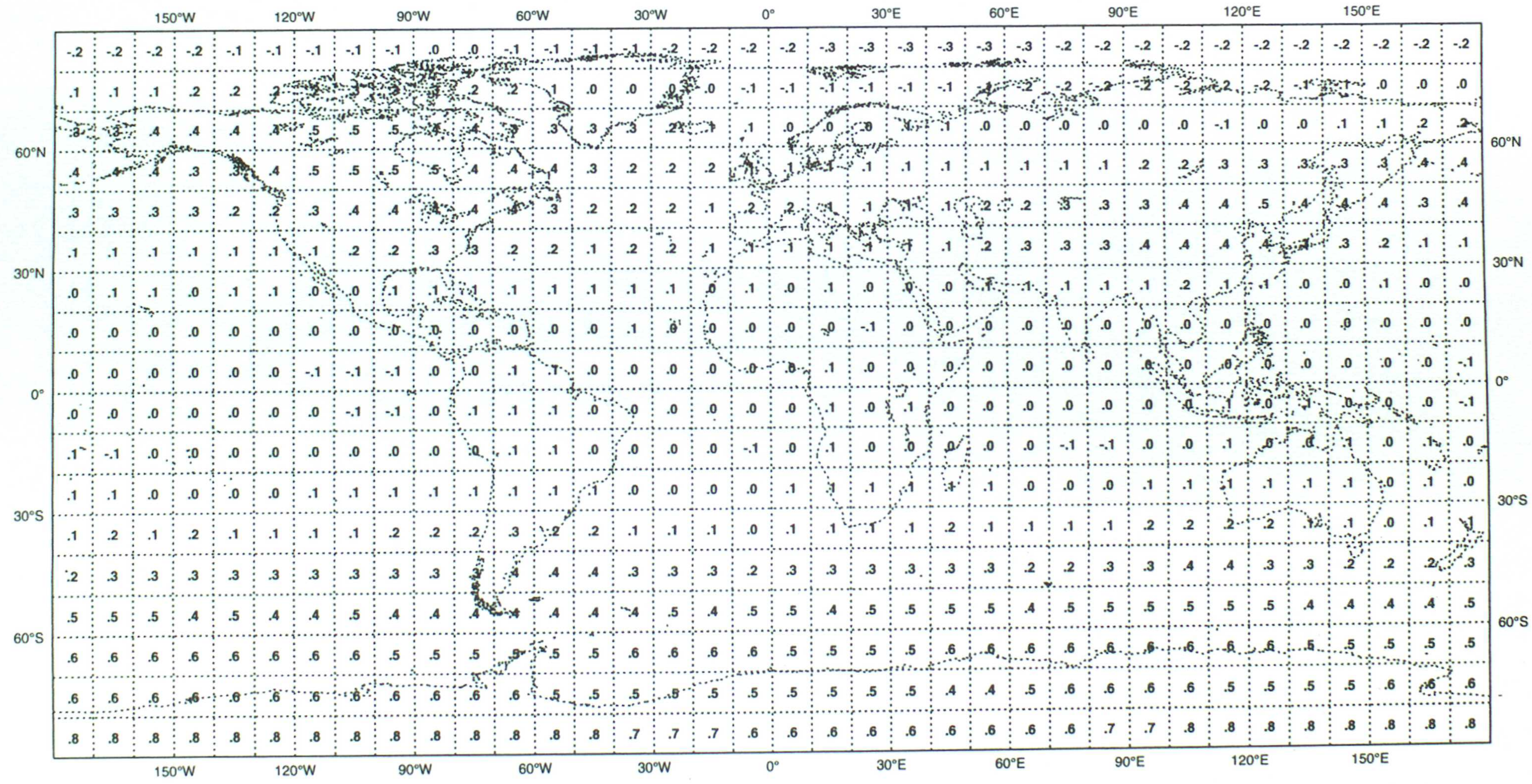

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

Figure 37. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-7 (300 hPa)
NOAA15, using all observations

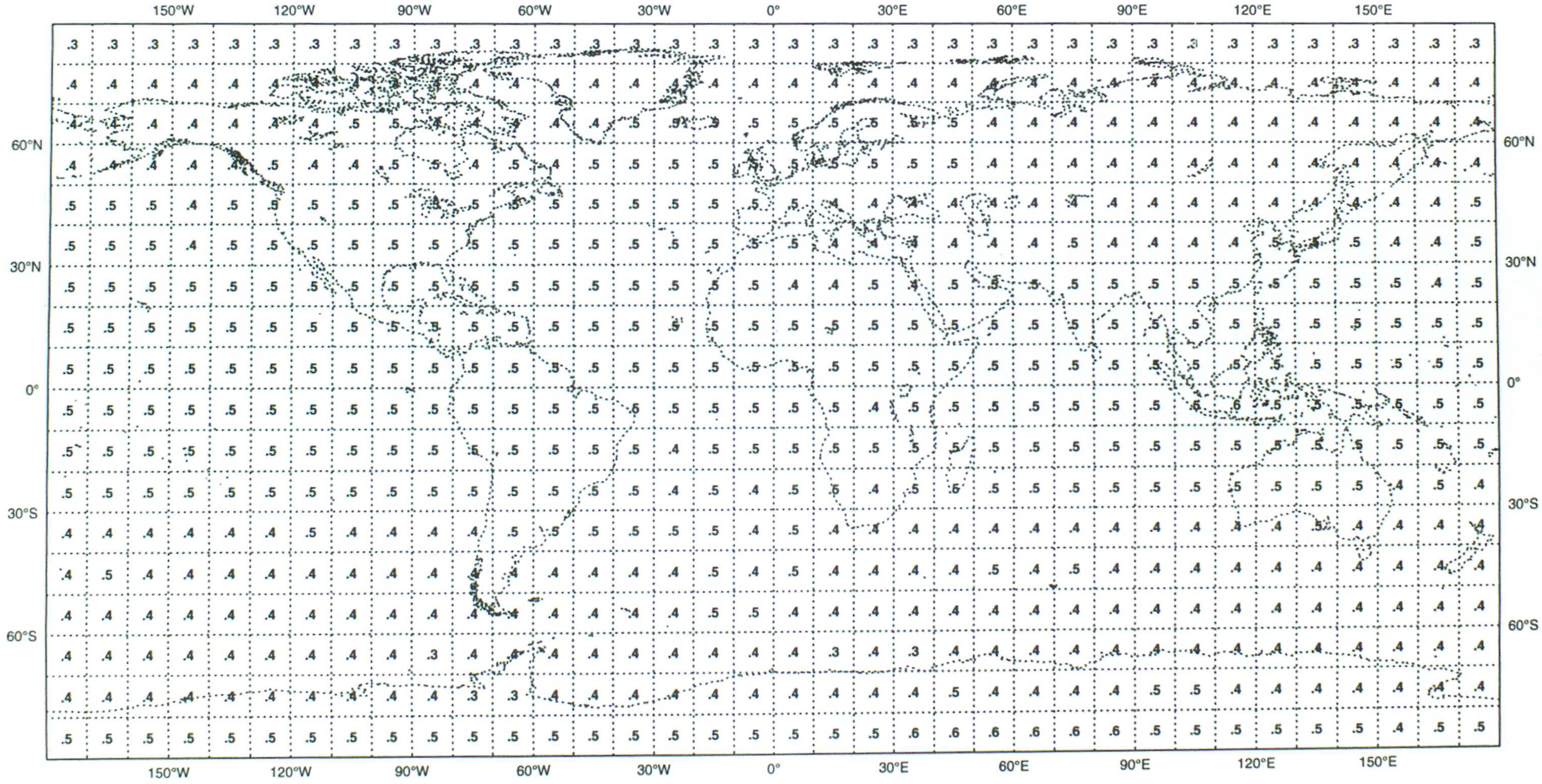

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

Figure 38. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-9 (100 hPa)
NOAA15, using all observations

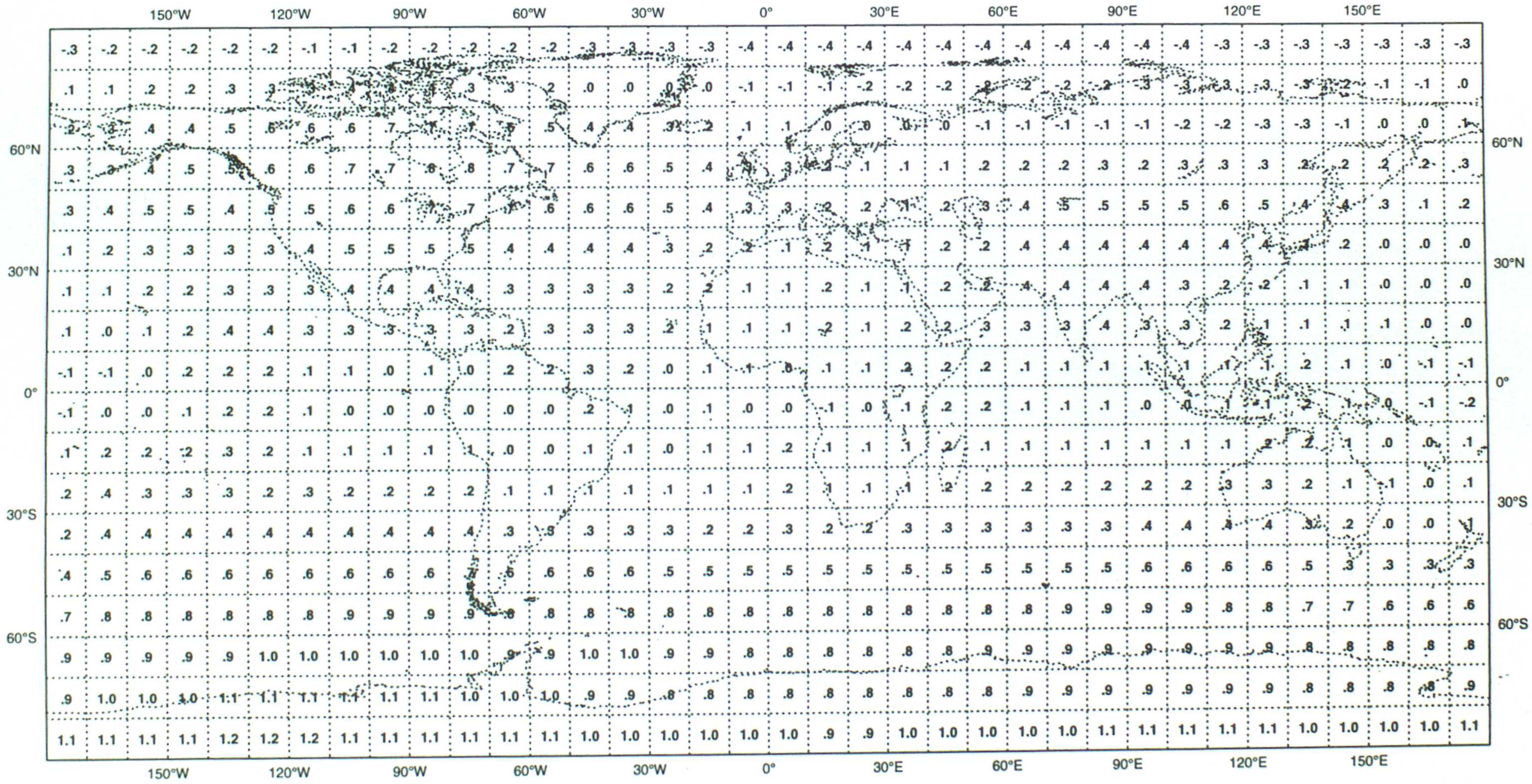

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
-.3 -.2 -.2 -.2 -.2 -.2 -.1 -.1 -.2 -.2 -.2 -.2 -.2 -.3 -.3 -.3 -.3 -.4 -.4 -.4 -.4 -.4 -.4 -.4 -.4 -.4 -.4 -.4 -.4 -.3 -.3 -.3 -.3 -.3 -.3 -.3
.1 .1 .2 .2 .3 .3 .3 .4 .4 .4 .3 .3 .2 .0 .0 .0 .0 -.1 -.1 -.1 -.2 -.2 -.2 -.2 -.2 -.2 -.2 -.3 -.3 -.3 -.3 -.3 -.2 -.1 -.1 .0
.2 .3 .4 .4 .5 .6 .6 .6 .7 .7 .7 .6 .5 .4 .4 .3 .2 .1 .1 .0 .0 .0 .0 -.1 -.1 -.1 -.1 -.1 -.2 -.2 -.3 -.3 -.1 .0 .0 .1
.3 .3 .4 .5 .5 .6 .6 .7 .7 .8 .8 .7 .7 .6 .6 .5 .4 .3 .3 .2 .1 .1 .1 .2 .2 .2 .3 .2 .3 .3 .3 .2 .2 .2 .2 .3
.3 .4 .5 .5 .4 .5 .5 .6 .6 .7 .7 .7 .6 .6 .6 .5 .4 .3 .3 .2 .2 .1 .2 .3 .4 .5 .5 .5 .5 .6 .5 .4 .4 .3 .1 .2
.1 .2 .3 .3 .3 .3 .4 .5 .5 .5 .5 .4 .4 .4 .4 .3 .2 .2 .1 .2 .1 .1 .2 .2 .4 .4 .4 .4 .4 .4 .4 .3 .2 .0 .0 .0
.1 .1 .2 .2 .3 .3 .3 .4 .4 .4 .4 .3 .3 .3 .3 .2 .2 .1 .1 .2 .1 .1 .2 .2 .4 .4 .4 .4 .3 .2 .2 .1 .1 .0 .0 .0
.1 .0 .1 .2 .4 .4 .3 .3 .3 .3 .3 .2 .3 .3 .3 .2 .1 .1 .1 .2 .1 .2 .2 .3 .3 .3 .4 .3 .3 .2 .1 .1 .1 .1 .0 .0
-.1 -.1 .0 .2 .2 .2 .1 .1 .0 .1 .0 .2 .2 .3 .2 .0 .1 .1 .0 .1 .1 .2 .2 .2 .1 .1 .1 .1 .1 .1 .1 .2 .1 .0 -.1 -.1
-.1 .0 .0 .1 .2 .2 .1 .0 .0 .0 .0 .0 .0 .2 .1 .0 .1 .0 .0 -.1 .0 .1 .2 .2 .1 .1 .1 .0 .0 .1 .1 .2 .1 .0 -.1 -.2
.1 .2 .2 .2 .3 .2 .1 .1 .1 .1 .1 .0 .0 .1 .1 .0 .1 .1 .2 .1 .1 .1 .2 .1 .1 .1 .1 .1 .1 .1 .2 .2 .1 .0 .0 .1
.2 .4 .3 .3 .3 .2 .3 .2 .2 .2 .2 .1 .1 .1 .1 .1 .1 .1 .2 .1 .1 .1 .2 .2 .2 .2 .2 .2 .2 .3 .3 .2 .1 -.1 .0 .1
.2 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .3 .3 .3 .3 .3 .2 .2 .3 .2 .2 .3 .3 .3 .3 .3 .3 .4 .4 .4 .4 .3 .2 .0 .0 .1
.4 .5 .6 .6 .6 .6 .6 .6 .6 .6 .7 .6 .6 .6 .6 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .6 .6 .6 .6 .5 .3 .3 .3 .3
.7 .8 .8 .8 .8 .8 .8 .9 .9 .9 .9 .8 .8 .8 .8 .8 .8 .8 .8 .8 .8 .8 .8 .8 .8 .9 .9 .9 .9 .8 .8 .7 .7 .6 .6 .6
.9 .9 .9 .9 .9 1.0 1.0 1.0 1.0 1.0 1.0 .9 .9 1.0 1.0 .9 .9 .8 .8 .8 .8 .8 .8 .9 .9 .9 .9 .9 .9 .9 .9 .8 .8 .8 .8 .8
.9 1.0 1.0 1.0 1.1 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 .9 .9 .8 .8 .8 .8 .8 .8 .8 .8 .8 .8 .9 .9 .9 .9 .9 .9 .9 .8 .8 .8 .8 .9
1.1 1.1 1.1 1.1 1.2 1.2 1.2 1.1 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 1.0 1.0 1.0 .9 .9 1.0 1.0 1.0 1.0 1.0 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 1.1

Figure 39. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-9 (100 hPa)
NOAA15, using all observations

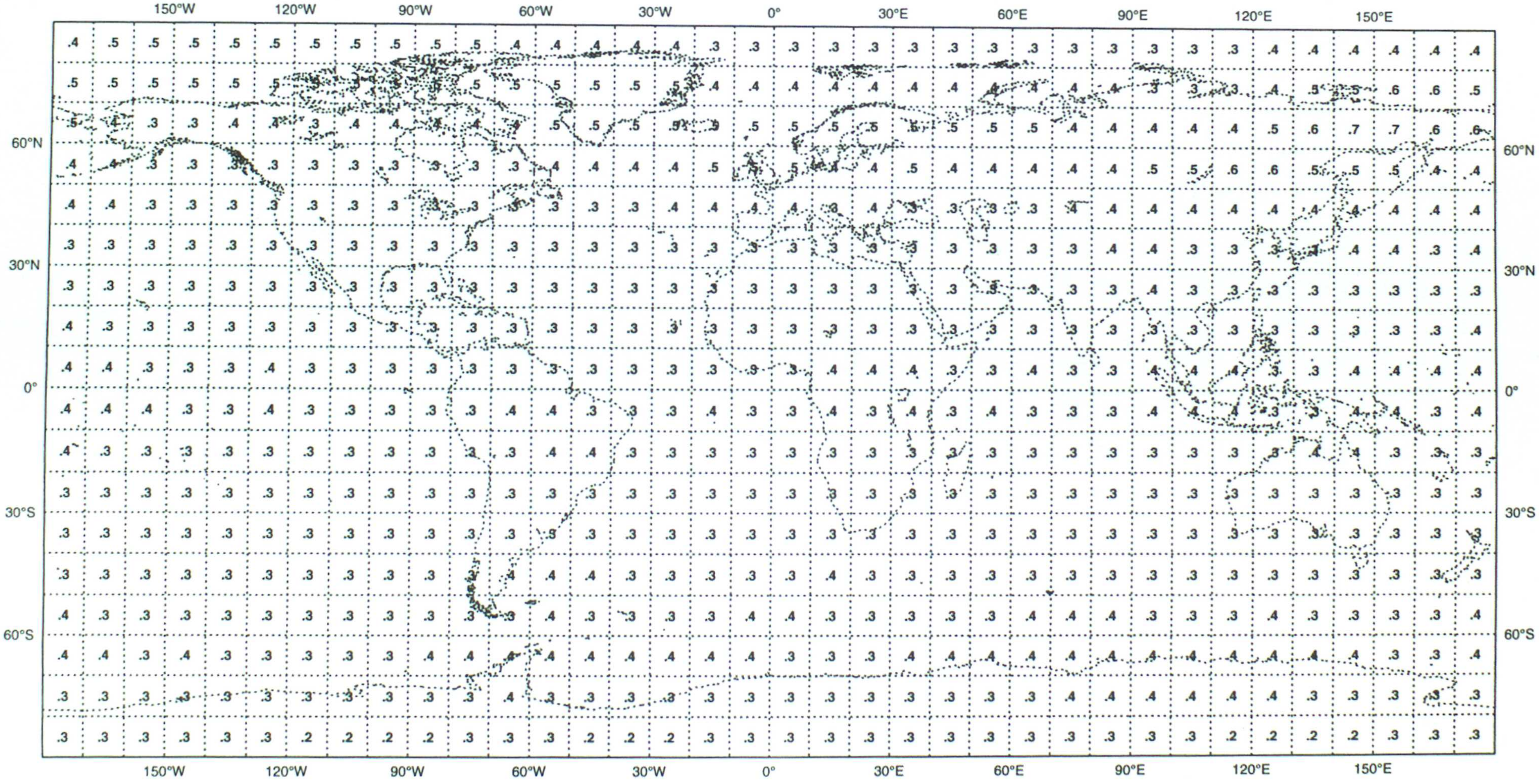
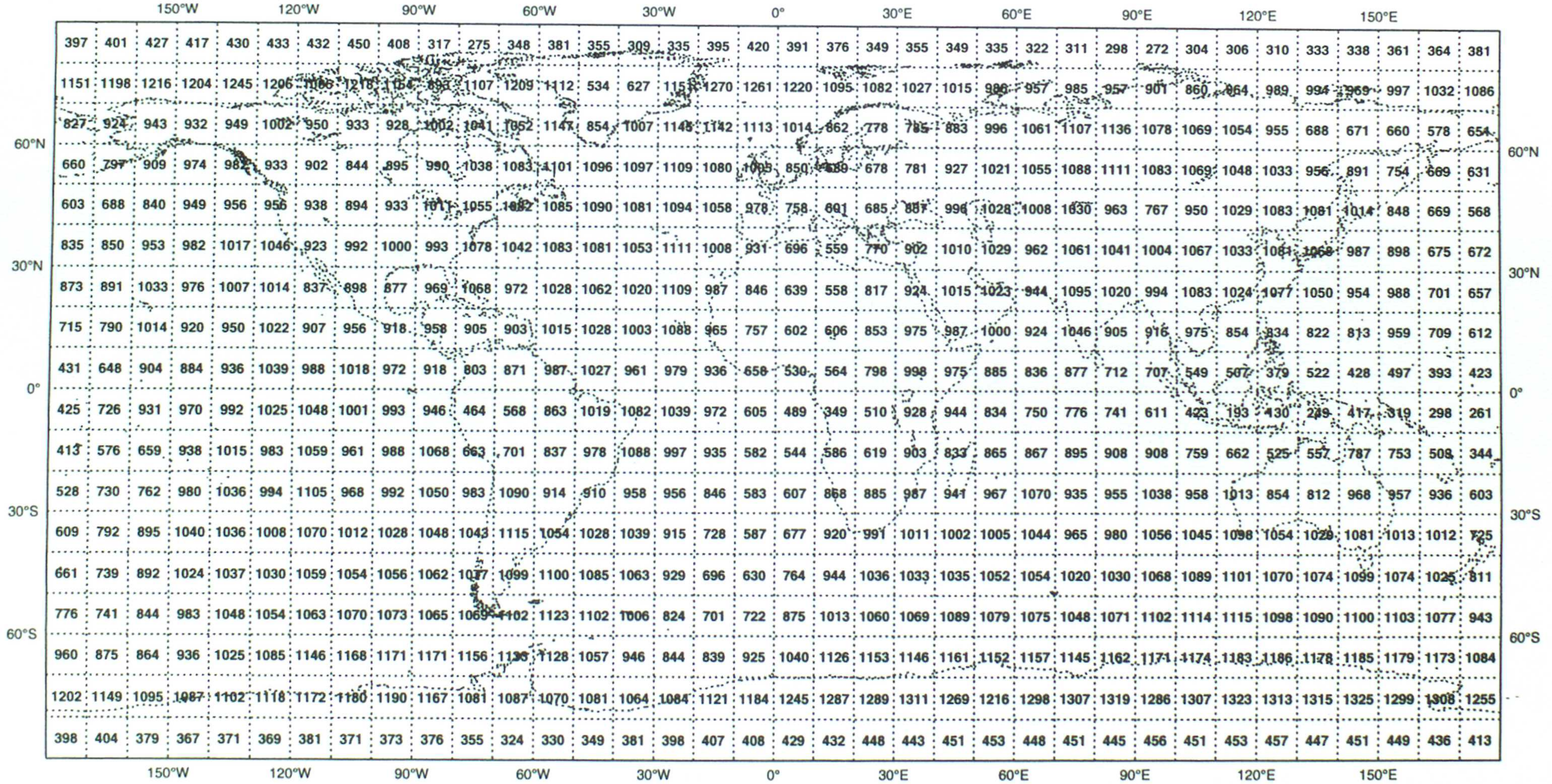

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

Figure 40. ATOVS mean daily count. DECEMBER 2003
NOAA16, using all observations
Global average number of observations in 24 hours = 570431



397	401	427	417	430	433	432	450	408	317	275	348	381	355	309	335	395	420	391	376	349	355	349	335	322	311	298	272	304	306	310	333	338	361	364	381
1151	1198	1216	1204	1245	1206	1066	1218	1154	893	1107	1209	1112	534	627	1151	1270	1261	1220	1095	1082	1027	1015	986	957	985	957	901	860	864	989	994	969	997	1032	1086
827	924	943	932	949	1002	950	933	928	1002	1041	1052	1147	854	1007	1148	1142	1113	1014	862	778	785	883	996	1061	1107	1136	1078	1069	1054	955	688	671	660	578	654
660	797	909	974	982	933	902	844	895	990	1038	1083	1101	1096	1097	1109	1080	1005	850	689	678	781	927	1021	1055	1088	1111	1083	1069	1048	1033	956	891	754	669	631
603	688	840	949	956	956	938	894	933	1011	1055	1082	1085	1090	1081	1094	1058	978	758	601	685	887	996	1028	1008	1030	963	767	950	1029	1083	1081	1014	848	669	568
835	850	953	982	1017	1046	923	992	1000	993	1078	1042	1083	1081	1053	1111	1008	931	696	559	770	902	1010	1029	962	1061	1041	1004	1067	1033	1081	1068	987	898	675	672
873	891	1033	976	1007	1014	837	898	877	969	1068	972	1028	1062	1020	1109	987	846	639	558	817	924	1015	1023	944	1095	1020	994	1083	1024	1077	1050	954	988	701	657
715	790	1014	920	950	1022	907	956	918	958	905	903	1015	1028	1003	1088	965	757	602	606	853	975	987	1000	924	1046	905	916	975	854	834	822	813	959	709	612
431	648	904	884	936	1039	988	1018	972	918	803	871	987	1027	961	979	936	658	530	564	798	998	975	885	836	877	712	707	549	507	379	522	428	497	393	423
425	726	931	970	992	1025	1048	1001	993	946	464	568	863	1019	1082	1039	972	605	489	349	510	928	944	834	750	776	741	611	423	193	430	249	417	319	298	261
413	576	659	938	1015	983	1059	961	988	1068	663	701	837	978	1088	997	935	582	544	586	619	903	833	865	867	895	908	908	759	662	525	557	787	753	508	344
528	730	762	980	1036	994	1105	968	992	1050	983	1090	914	910	958	956	846	583	607	868	885	987	941	967	1070	935	955	1038	958	1013	854	812	968	957	936	603
609	792	895	1040	1036	1008	1070	1012	1028	1048	1043	1115	1054	1028	1039	915	728	587	677	920	991	1011	1002	1005	1044	965	980	1056	1045	1098	1054	1029	1081	1013	1012	725
661	739	892	1024	1037	1030	1059	1054	1056	1062	1077	1099	1100	1085	1063	929	696	630	764	944	1036	1033	1035	1052	1054	1020	1030	1068	1089	1101	1070	1074	1099	1074	1025	811
776	741	844	983	1048	1054	1063	1070	1073	1065	1069	1102	1123	1102	1006	824	701	722	875	1013	1060	1069	1089	1079	1075	1048	1071	1102	1114	1115	1098	1090	1100	1103	1077	943
960	875	864	936	1025	1085	1146	1168	1171	1171	1156	1136	1128	1057	946	844	839	925	1040	1126	1153	1146	1161	1152	1157	1145	1162	1171	1174	1183	1186	1178	1185	1179	1173	1084
1202	1149	1095	1087	1102	1118	1172	1180	1190	1167	1081	1087	1070	1081	1064	1084	1121	1184	1245	1287	1289	1311	1269	1216	1298	1307	1319	1286	1307	1323	1313	1315	1325	1299	1308	1255
398	404	379	367	371	369	381	371	373	376	355	324	330	349	381	398	407	408	429	432	448	443	451	453	448	451	445	456	451	453	457	447	451	449	436	413

Figure 41. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS8 (Surface)
NOAA16, using all observations

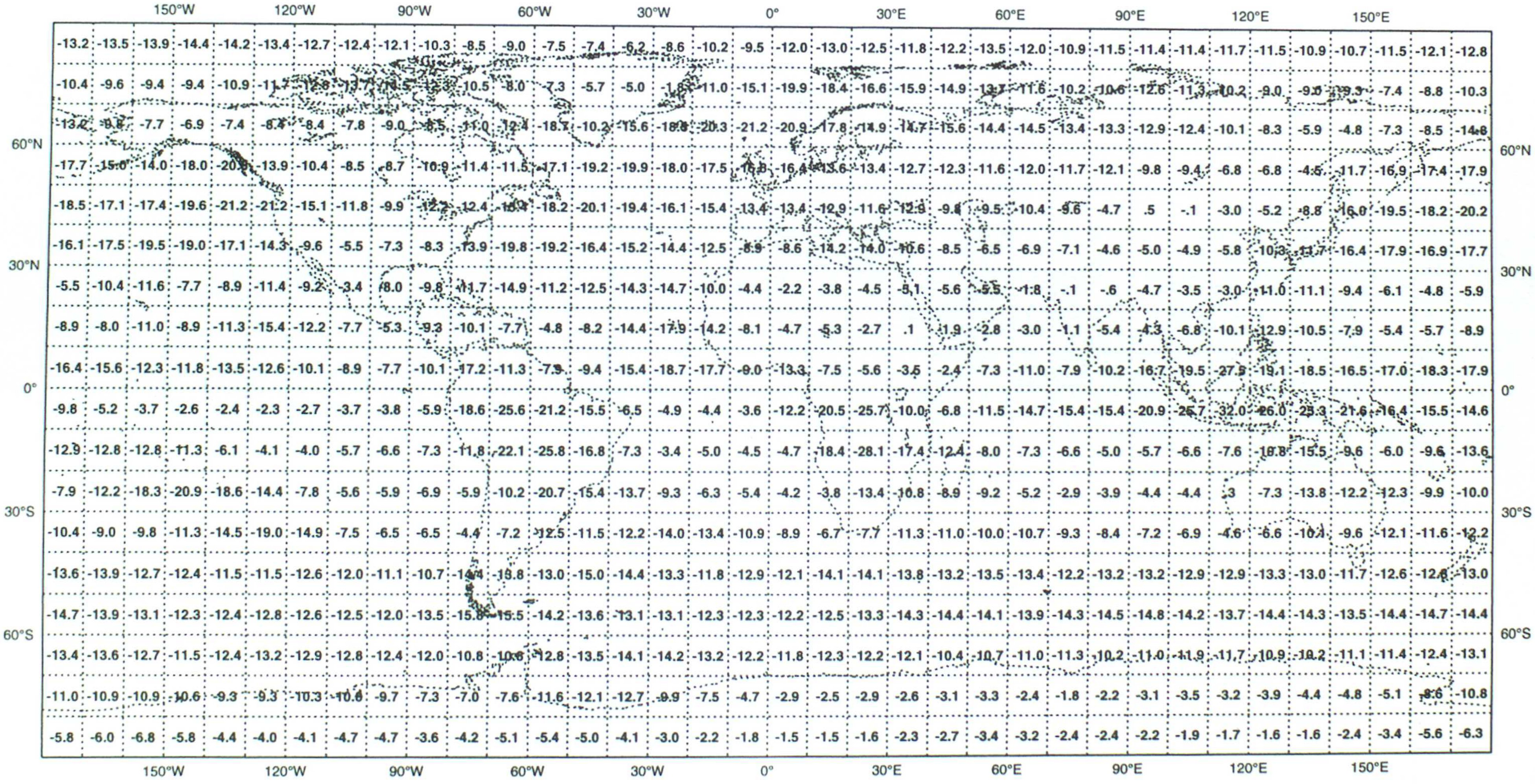
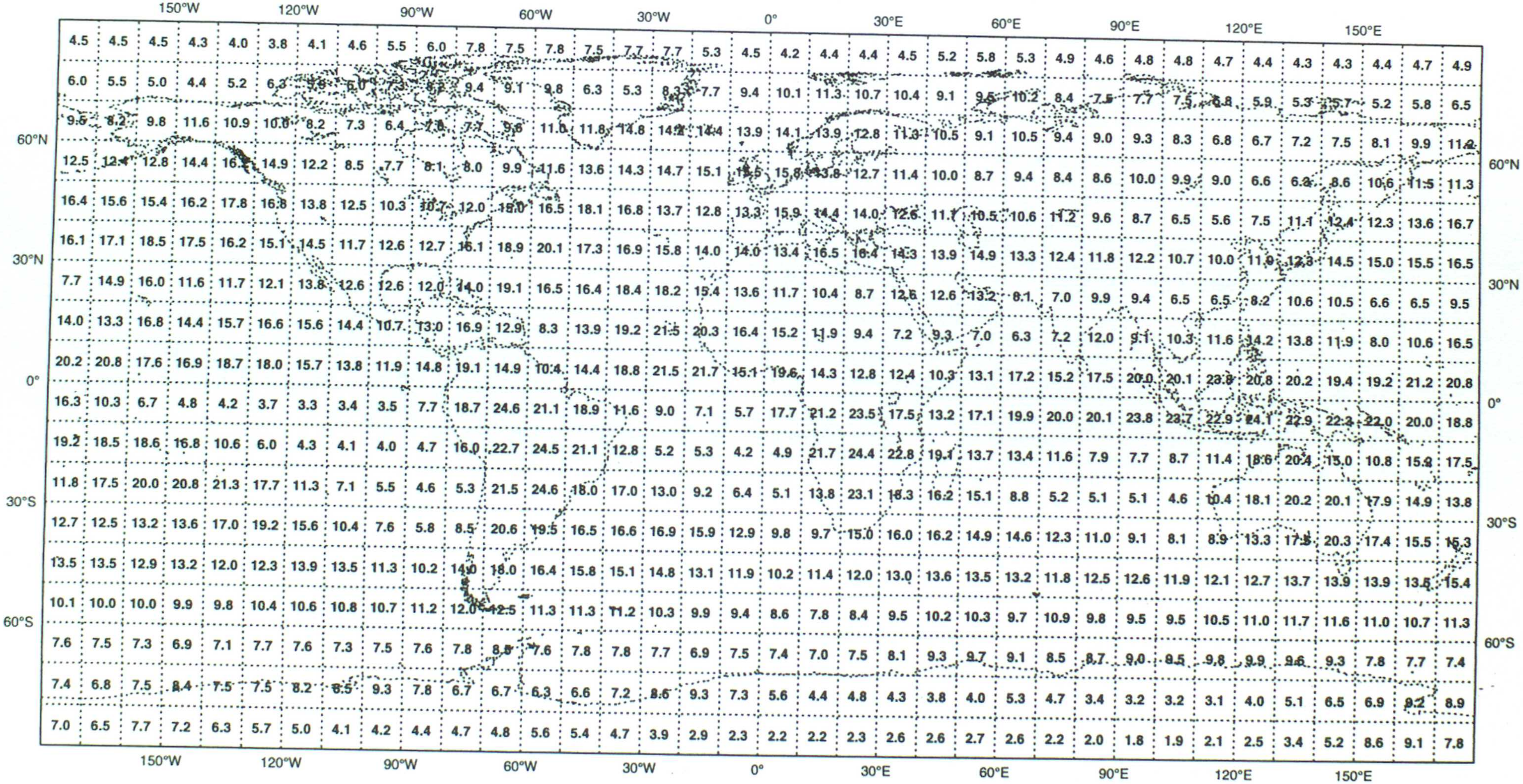

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
-13.2 -13.5 -13.9 -14.4 -14.2 -13.4 -12.7 -12.4 -12.1 -10.3 -8.5 -9.0 -7.5 -7.4 -6.2 -8.6 -10.2 -9.5 -12.0 -13.0 -12.5 -11.8 -12.2 -13.5 -12.0 -10.9 -11.5 -11.4 -11.4 -11.7 -11.5 -10.9 -10.7 -11.5 -12.1 -12.8
-10.4 -9.6 -9.4 -9.4 -10.9 -11.7 -12.8 -13.7 -11.5 -12.3 -10.5 -8.0 -7.3 -5.7 -5.0 -1.6 -11.0 -15.1 -19.9 -18.4 -16.6 -15.9 -14.9 -13.7 -11.6 -10.2 -10.6 -12.6 -11.3 -10.2 -9.0 -9.0 -13.3 -7.4 -8.8 -10.3
-13.2 -9.8 -7.7 -6.9 -7.4 -8.4 -8.4 -7.8 -9.0 -8.5 -11.0 -12.4 -18.7 -10.2 -15.6 -18.8 -20.3 -21.2 -20.9 -17.8 -14.9 -14.7 -15.6 -14.4 -14.5 -13.4 -13.3 -12.9 -12.4 -10.1 -8.3 -5.9 -4.8 -7.3 -8.5 -14.8
-17.7 -15.0 -14.0 -18.0 -20.8 -13.9 -10.4 -8.5 -8.7 -10.9 -11.4 -11.5 -17.1 -19.2 -19.9 -18.0 -17.5 -16.8 -16.4 -13.6 -13.4 -12.7 -12.3 -11.6 -12.0 -11.7 -12.1 -9.8 -9.4 -6.8 -6.8 -4.5 -11.7 -16.9 -17.4 -17.9
-18.5 -17.1 -17.4 -19.6 -21.2 -21.2 -15.1 -11.8 -9.9 -12.2 -12.4 -18.4 -18.2 -20.1 -19.4 -16.1 -15.4 -13.4 -13.4 -12.9 -11.6 -12.9 -9.8 -9.5 -10.4 -9.6 -4.7 .5 -.1 -3.0 -5.2 -8.8 -16.0 -19.5 -18.2 -20.2
-16.1 -17.5 -19.5 -19.0 -17.1 -14.3 -9.6 -5.5 -7.3 -8.3 -13.9 -19.8 -19.2 -16.4 -15.2 -14.4 -12.5 -8.9 -8.6 -14.2 -14.0 -10.6 -8.5 -6.5 -6.9 -7.1 -4.6 -5.0 -4.9 -5.8 -10.3 -13.7 -16.4 -17.9 -16.9 -17.7
-5.5 -10.4 -11.6 -7.7 -8.9 -11.4 -9.2 -3.4 -8.0 -9.8 -11.7 -14.9 -11.2 -12.5 -14.3 -14.7 -10.0 -4.4 -2.2 -3.8 -4.5 -5.1 -5.6 -5.5 -1.8 -.1 -.6 -4.7 -3.5 -3.0 -11.0 -11.1 -9.4 -6.1 -4.8 -5.9
-8.9 -8.0 -11.0 -8.9 -11.3 -15.4 -12.2 -7.7 -5.3 -9.3 -10.1 -7.7 -4.8 -8.2 -14.4 -17.9 -14.2 -8.1 -4.7 -5.3 -2.7 .1 -1.9 -2.8 -3.0 -1.1 -5.4 -4.3 -6.8 -10.1 -12.9 -10.5 -7.9 -5.4 -5.7 -8.9
-16.4 -15.6 -12.3 -11.8 -13.5 -12.6 -10.1 -8.9 -7.7 -10.1 -17.2 -11.3 -7.9 -9.4 -15.4 -18.7 -17.7 -9.0 -13.3 -7.5 -5.6 -3.5 -2.4 -7.3 -11.0 -7.9 -10.2 -16.7 -19.5 -27.5 -19.1 -18.5 -16.5 -17.0 -18.3 -17.9
-9.8 -5.2 -3.7 -2.6 -2.4 -2.3 -2.7 -3.7 -3.8 -5.9 -18.6 -25.6 -21.2 -15.5 -6.5 -4.9 -4.4 -3.6 -12.2 -20.5 -25.7 -10.0 -6.8 -11.5 -14.7 -15.4 -15.4 -20.9 -25.7 -32.0 -26.0 -23.3 -21.6 -16.4 -15.5 -14.6
-12.9 -12.8 -12.8 -11.3 -6.1 -4.1 -4.0 -5.7 -6.6 -7.3 -11.8 -22.1 -25.8 -16.8 -7.3 -3.4 -5.0 -4.5 -4.7 -18.4 -28.1 -17.4 -12.4 -8.0 -7.3 -6.6 -5.0 -5.7 -6.6 -7.6 -10.8 -15.5 -9.6 -6.0 -9.6 -13.6
-7.9 -12.2 -18.3 -20.9 -18.6 -14.4 -7.8 -5.6 -5.9 -6.9 -5.9 -10.2 -20.7 -15.4 -13.7 -9.3 -6.3 -5.4 -4.2 -3.8 -13.4 -10.8 -8.9 -9.2 -5.2 -2.9 -3.9 -4.4 -4.4 .3 -7.3 -13.8 -12.2 -12.3 -9.9 -10.0
-10.4 -9.0 -9.8 -11.3 -14.5 -19.0 -14.9 -7.5 -6.5 -6.5 -4.4 -7.2 -12.5 -11.5 -12.2 -14.0 -13.4 -10.9 -8.9 -6.7 -7.7 -11.3 -11.0 -10.0 -10.7 -9.3 -8.4 -7.2 -6.9 -4.6 -6.6 -10.1 -9.6 -12.1 -11.6 -12.2
-13.6 -13.9 -12.7 -12.4 -11.5 -11.5 -12.6 -12.0 -11.1 -10.7 -14.4 -16.8 -13.0 -15.0 -14.4 -13.3 -11.8 -12.9 -12.1 -14.1 -14.1 -13.8 -13.2 -13.5 -13.4 -12.2 -13.2 -13.2 -12.9 -12.9 -13.3 -13.0 -11.7 -12.6 -12.8 -13.0
-14.7 -13.9 -13.1 -12.3 -12.4 -12.8 -12.6 -12.5 -12.0 -13.5 -15.8 -15.5 -14.2 -13.6 -13.1 -13.1 -12.3 -12.3 -12.2 -12.5 -13.3 -14.3 -14.4 -14.1 -13.9 -14.3 -14.5 -14.8 -14.2 -13.7 -14.4 -14.3 -13.5 -14.4 -14.7 -14.4
-13.4 -13.6 -12.7 -11.5 -12.4 -13.2 -12.9 -12.8 -12.4 -12.0 -10.8 -10.6 -12.8 -13.5 -14.1 -14.2 -13.2 -12.2 -11.8 -12.3 -12.2 -12.1 -10.4 -10.7 -11.0 -11.3 -10.2 -11.0 -11.9 -11.7 -10.9 -10.2 -11.1 -11.4 -12.4 -13.1
-11.0 -10.9 -10.9 -10.6 -9.3 -9.3 -10.3 -10.6 -9.7 -7.3 -7.0 -7.6 -11.6 -12.1 -12.7 -9.9 -7.5 -4.7 -2.9 -2.5 -2.9 -2.6 -3.1 -3.3 -2.4 -1.8 -2.2 -3.1 -3.5 -3.2 -3.9 -4.4 -4.8 -5.1 -8.6 -10.8
-5.8 -6.0 -6.8 -5.8 -4.4 -4.0 -4.1 -4.7 -4.7 -3.6 -4.2 -5.1 -5.4 -5.0 -4.1 -3.0 -2.2 -1.8 -1.5 -1.5 -1.6 -2.3 -2.7 -3.4 -3.2 -2.4 -2.4 -2.2 -1.9 -1.7 -1.6 -1.6 -2.4 -3.4 -5.6 -6.3

Figure 42. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS8 (Surface)
NOAA16, using all observations



4.5	4.5	4.5	4.3	4.0	3.8	4.1	4.6	5.5	6.0	7.8	7.5	7.8	7.5	7.7	7.7	5.3	4.5	4.2	4.4	4.4	4.5	5.2	5.8	5.3	4.9	4.6	4.8	4.8	4.7	4.4	4.3	4.3	4.4	4.7	4.9
6.0	5.5	5.0	4.4	5.2	6.3	5.8	6.0	7.3	8.2	9.4	9.1	9.8	6.3	5.3	8.3	7.7	9.4	10.1	11.3	10.7	10.4	9.1	9.5	10.2	8.4	7.5	7.7	7.5	6.8	5.9	5.3	5.7	5.2	5.8	6.5
9.5	8.2	9.8	11.6	10.9	10.6	8.2	7.3	6.4	7.8	7.7	9.6	11.0	11.8	14.8	14.2	14.4	13.9	14.1	13.9	12.8	11.3	10.5	9.1	10.5	9.4	9.0	9.3	8.3	6.8	6.7	7.2	7.5	8.1	9.9	11.2
12.5	12.4	12.8	14.4	16.2	14.9	12.2	8.5	7.7	8.1	8.0	9.9	11.6	13.6	14.3	14.7	15.1	15.5	15.8	13.8	12.7	11.4	10.0	8.7	9.4	8.4	8.6	10.0	9.9	9.0	6.6	6.3	8.6	10.6	11.5	11.3
16.4	15.6	15.4	16.2	17.8	16.8	13.8	12.5	10.3	10.7	12.0	18.0	16.5	18.1	16.8	13.7	12.8	13.3	15.9	14.4	14.0	12.6	11.1	10.5	10.6	11.2	9.6	8.7	6.5	5.6	7.5	11.1	12.4	12.3	13.6	16.7
16.1	17.1	18.5	17.5	16.2	15.1	14.5	11.7	12.6	12.7	16.1	18.9	20.1	17.3	16.9	15.8	14.0	14.0	13.4	16.5	16.4	14.3	13.9	14.9	13.3	12.4	11.8	12.2	10.7	10.0	11.9	12.3	14.5	15.0	15.5	16.5
7.7	14.9	16.0	11.6	11.7	12.1	13.8	12.6	12.6	12.0	14.0	19.1	16.5	16.4	18.4	18.2	15.4	13.6	11.7	10.4	8.7	12.6	12.6	13.2	8.1	7.0	9.9	9.4	6.5	6.5	8.2	10.6	10.5	6.6	6.5	9.5
14.0	13.3	16.8	14.4	15.7	16.6	15.6	14.4	10.7	13.0	16.9	12.9	8.3	13.9	19.2	21.5	20.3	16.4	15.2	11.9	9.4	7.2	9.3	7.0	6.3	7.2	12.0	9.1	10.3	11.6	14.2	13.8	11.9	8.0	10.6	16.5
20.2	20.8	17.6	16.9	18.7	18.0	15.7	13.8	11.9	14.8	19.1	14.9	10.4	14.4	18.8	21.5	21.7	15.1	19.6	14.3	12.8	12.4	10.3	13.1	17.2	15.2	17.5	20.0	20.1	23.8	20.8	20.2	19.4	19.2	21.2	20.8
16.3	10.3	6.7	4.8	4.2	3.7	3.3	3.4	3.5	7.7	18.7	24.6	21.1	18.9	11.6	9.0	7.1	5.7	17.7	21.2	23.5	17.5	13.2	17.1	19.9	20.0	20.1	23.8	23.7	22.9	24.1	22.9	22.3	22.0	20.0	18.8
19.2	18.5	18.6	16.8	10.6	6.0	4.3	4.1	4.0	4.7	16.0	22.7	24.5	21.1	12.8	5.2	5.3	4.2	4.9	21.7	24.4	22.8	19.1	13.7	13.4	11.6	7.9	7.7	8.7	11.4	18.6	20.4	15.0	10.8	15.8	17.5
11.8	17.5	20.0	20.8	21.3	17.7	11.3	7.1	5.5	4.6	5.3	21.5	24.6	18.0	17.0	13.0	9.2	6.4	5.1	13.8	23.1	18.3	16.2	15.1	8.8	5.2	5.1	5.1	4.6	10.4	18.1	20.2	20.1	17.9	14.9	13.8
12.7	12.5	13.2	13.6	17.0	19.2	15.6	10.4	7.6	5.8	8.5	20.6	19.5	16.5	16.6	16.9	15.9	12.9	9.8	9.7	15.0	16.0	16.2	14.9	14.6	12.3	11.0	9.1	8.1	8.9	13.3	17.5	20.3	17.4	15.5	15.3
13.5	13.5	12.9	13.2	12.0	12.3	13.9	13.5	11.3	10.2	14.0	18.0	16.4	15.8	15.1	14.8	13.1	11.9	10.2	11.4	12.0	13.0	13.6	13.5	13.2	11.8	12.5	12.6	11.9	12.1	12.7	13.7	13.9	13.9	13.5	15.4
10.1	10.0	10.0	9.9	9.8	10.4	10.6	10.8	10.7	11.2	12.0	12.5	11.3	11.3	11.2	10.3	9.9	9.4	8.6	7.8	8.4	9.5	10.2	10.3	9.7	10.9	9.8	9.5	9.5	10.5	11.0	11.7	11.6	11.0	10.7	11.3
7.6	7.5	7.3	6.9	7.1	7.7	7.6	7.3	7.5	7.6	7.8	8.5	7.6	7.8	7.8	7.7	6.9	7.5	7.4	7.0	7.5	8.1	9.3	9.7	9.1	8.5	8.7	9.0	8.5	9.8	9.9	9.6	9.3	7.8	7.7	7.4
7.4	6.8	7.5	8.4	7.5	7.5	8.2	8.5	9.3	7.8	6.7	6.7	6.3	6.6	7.2	8.6	9.3	7.3	5.6	4.4	4.8	4.3	3.8	4.0	5.3	4.7	3.4	3.2	3.2	3.1	4.0	5.1	6.5	6.9	9.2	8.9
7.0	6.5	7.7	7.2	6.3	5.7	5.0	4.1	4.2	4.4	4.7	4.8	5.6	5.4	4.7	3.9	2.9	2.3	2.2	2.2	2.3	2.6	2.6	2.7	2.6	2.2	2.0	1.8	1.9	2.1	2.5	3.4	5.2	8.6	9.1	7.8

Figure 43. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS15 (700 hPa)
NOAA16, using all observations

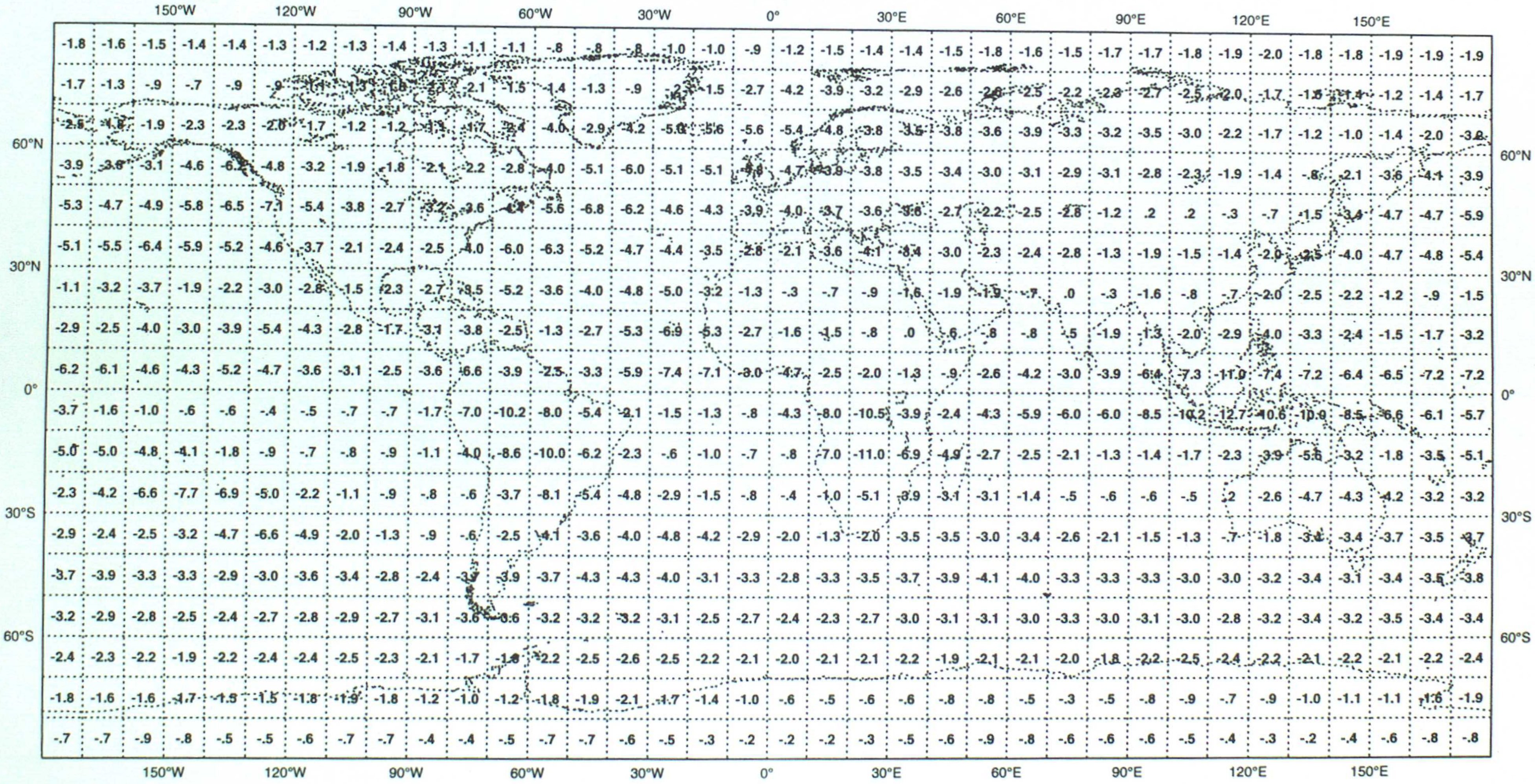
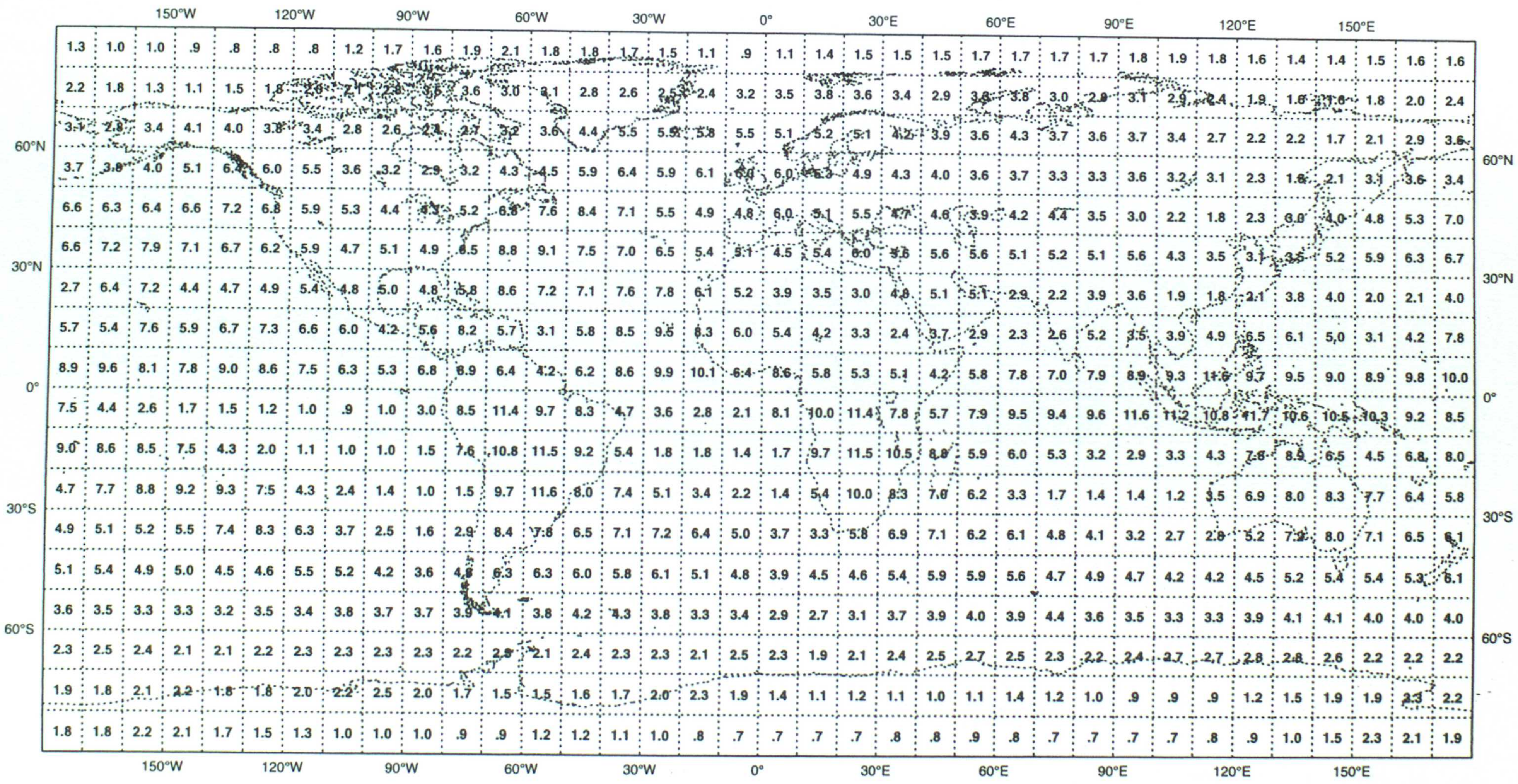
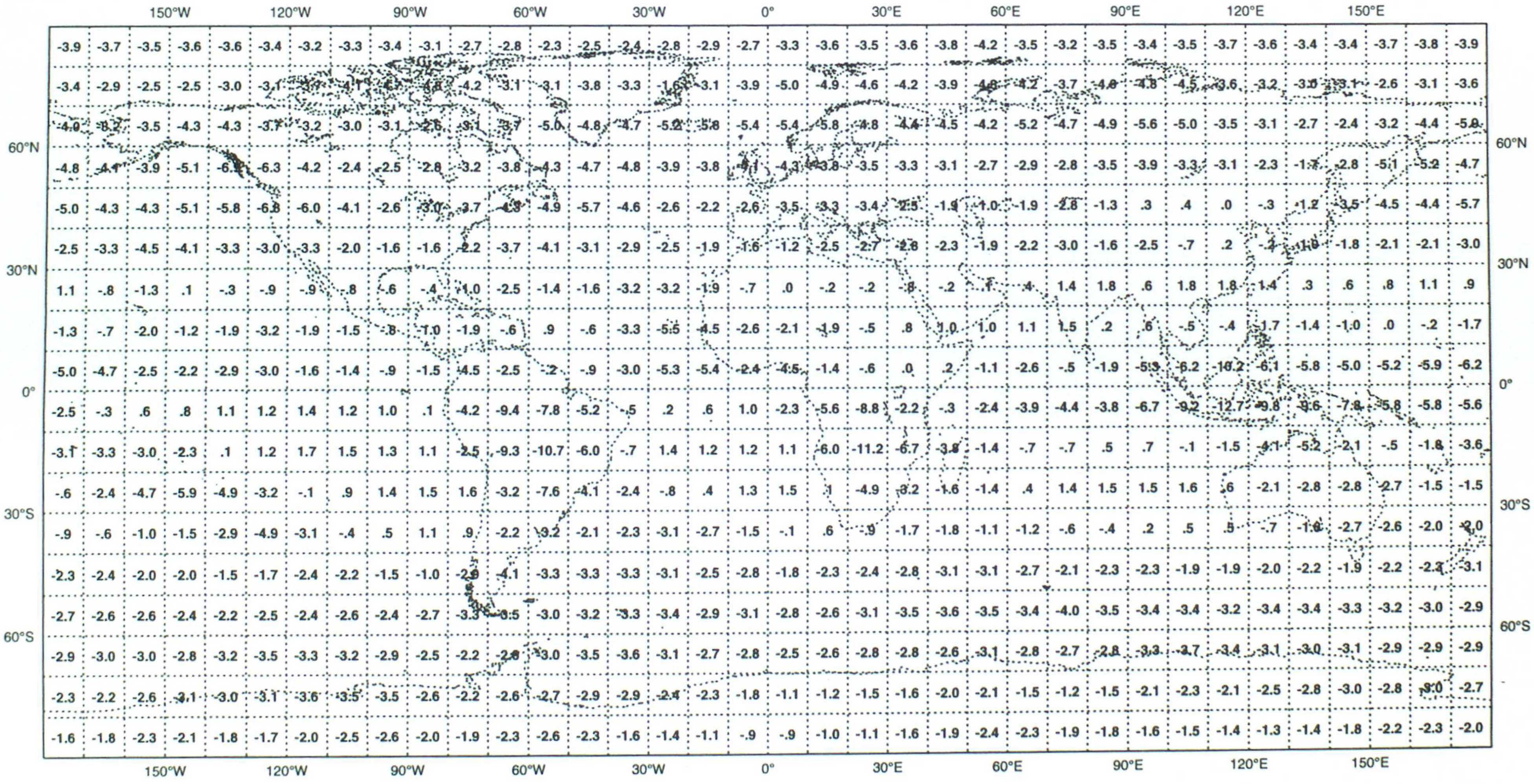

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
-1.8 -1.6 -1.5 -1.4 -1.4 -1.3 -1.2 -1.3 -1.4 -1.3 -1.1 -1.1 -.8 -.8 -.8 -1.0 -1.0 -.9 -1.2 -1.5 -1.4 -1.4 -1.5 -1.8 -1.6 -1.5 -1.7 -1.7 -1.8 -1.9 -2.0 -1.8 -1.8 -1.9 -1.9 -1.9
-1.7 -1.3 -.9 -.7 -.9 -.9 -1.1 -1.3 -1.8 [illegible] -2.1 -1.5 -1.4 -1.3 -.9 -.2 -1.5 -2.7 -4.2 -3.9 -3.2 -2.9 -2.6 -2.6 -2.5 -2.2 -2.8 -2.7 -2.5 -2.0 -1.7 -1.5 -1.4 -1.2 -1.4 -1.7
-2.5 -1.8 -1.9 -2.3 -2.3 -2.0 -1.7 -1.2 -1.2 -1.3 -1.7 -2.4 -4.0 -2.9 -4.2 -5.0 -5.6 -5.6 -5.4 -4.8 -3.8 -3.5 -3.8 -3.6 -3.9 -3.3 -3.2 -3.5 -3.0 -2.2 -1.7 -1.2 -1.0 -1.4 -2.0 -3.8
-3.9 -3.6 -3.1 -4.6 -6.2 -4.8 -3.2 -1.9 -1.8 -2.1 -2.2 -2.8 -4.0 -5.1 -6.0 -5.1 -5.1 [illegible] -4.7 -3.9 -3.8 -3.5 -3.4 -3.0 -3.1 -2.9 -3.1 -2.8 -2.3 -1.9 -1.4 -.8 -2.1 -3.6 -4.1 -3.9
-5.3 -4.7 -4.9 -5.8 -6.5 -7.1 -5.4 -3.8 -2.7 -3.2 -3.6 [illegible] -5.6 -6.8 -6.2 -4.6 -4.3 -3.9 -4.0 -3.7 -3.6 -3.6 -2.7 -2.2 -2.5 -2.8 -1.2 .2 .2 -.3 -.7 -1.5 -3.4 -4.7 -4.7 -5.9
-5.1 -5.5 -6.4 -5.9 -5.2 -4.6 -3.7 -2.1 -2.4 -2.5 -4.0 -6.0 -6.3 -5.2 -4.7 -4.4 -3.5 -2.8 -2.1 -3.6 -4.1 [illegible] -3.0 -2.3 -2.4 -2.8 -1.3 -1.9 -1.5 -1.4 -2.0 -2.5 -4.0 -4.7 -4.8 -5.4
-1.1 -3.2 -3.7 -1.9 -2.2 -3.0 -2.8 -1.5 -2.3 -2.7 -3.5 -5.2 -3.6 -4.0 -4.8 -5.0 -3.2 -1.3 -.3 -.7 -.9 -1.6 -1.9 -1.9 -.7 .0 -.3 -1.6 -.8 -.7 -2.0 -2.5 -2.2 -1.2 -.9 -1.5
-2.9 -2.5 -4.0 -3.0 -3.9 -5.4 -4.3 -2.8 -1.7 -3.1 -3.8 -2.5 -1.3 -2.7 -5.3 -6.9 -5.3 -2.7 -1.6 -1.5 -.8 .0 -.6 -.8 -.8 -.5 -1.9 -1.3 -2.0 -2.9 -4.0 -3.3 -2.4 -1.5 -1.7 -3.2
-6.2 -6.1 -4.6 -4.3 -5.2 -4.7 -3.6 -3.1 -2.5 -3.6 -6.6 -3.9 -2.5 -3.3 -5.9 -7.4 -7.1 -3.0 -4.7 -2.5 -2.0 -1.3 -.9 -2.6 -4.2 -3.0 -3.9 -6.4 -7.3 -11.0 -7.4 -7.2 -6.4 -6.5 -7.2 -7.2
-3.7 -1.6 -1.0 -.6 -.6 -.4 -.5 -.7 -.7 -1.7 -7.0 -10.2 -8.0 -5.4 -2.1 -1.5 -1.3 -.8 -4.3 -8.0 -10.5 -3.9 -2.4 -4.3 -5.9 -6.0 -6.0 -8.5 -10.2 -12.7 -10.6 -10.9 -8.5 -6.6 -6.1 -5.7
-5.0 -5.0 -4.8 -4.1 -1.8 -.9 -.7 -.8 -.9 -1.1 -4.0 -8.6 -10.0 -6.2 -2.3 -.6 -1.0 -.7 -.8 -7.0 -11.0 -6.9 -4.9 -2.7 -2.5 -2.1 -1.3 -1.4 -1.7 -2.3 -3.9 -5.6 -3.2 -1.8 -3.5 -5.1
-2.3 -4.2 -6.6 -7.7 -6.9 -5.0 -2.2 -1.1 -.9 -.8 -.6 -3.7 -8.1 -5.4 -4.8 -2.9 -1.5 -.8 -.4 -1.0 -5.1 -3.9 -3.1 -3.1 -1.4 -.5 -.6 -.6 -.5 .2 -2.6 -4.7 -4.3 -4.2 -3.2 -3.2
-2.9 -2.4 -2.5 -3.2 -4.7 -6.6 -4.9 -2.0 -1.3 -.9 -.6 -2.5 -4.1 -3.6 -4.0 -4.8 -4.2 -2.9 -2.0 -1.3 -2.0 -3.5 -3.5 -3.0 -3.4 -2.6 -2.1 -1.5 -1.3 -.7 -1.8 -3.4 -3.4 -3.7 -3.5 -3.7
-3.7 -3.9 -3.3 -3.3 -2.9 -3.0 -3.6 -3.4 -2.8 -2.4 -3.7 -3.9 -3.7 -4.3 -4.3 -4.0 -3.1 -3.3 -2.8 -3.3 -3.5 -3.7 -3.9 -4.1 -4.0 -3.3 -3.3 -3.3 -3.0 -3.0 -3.2 -3.4 -3.1 -3.4 -3.5 -3.8
-3.2 -2.9 -2.8 -2.5 -2.4 -2.7 -2.8 -2.9 -2.7 -3.1 -3.6 -3.6 -3.2 -3.2 -3.2 -3.1 -2.5 -2.7 -2.4 -2.3 -2.7 -3.0 -3.1 -3.1 -3.0 -3.3 -3.0 -3.1 -3.0 -2.8 -3.2 -3.4 -3.2 -3.5 -3.4 -3.4
-2.4 -2.3 -2.2 -1.9 -2.2 -2.4 -2.4 -2.5 -2.3 -2.1 -1.7 -1.8 -2.2 -2.5 -2.6 -2.5 -2.2 -2.1 -2.0 -2.1 -2.1 -2.2 -1.9 -2.1 -2.1 -2.0 -1.8 -2.2 -2.5 -2.4 -2.2 -2.1 -2.2 -2.1 -2.2 -2.4
-1.8 -1.6 -1.6 -1.7 -1.5 -1.5 -1.8 -1.9 -1.8 -1.2 -1.0 -1.2 -1.8 -1.9 -2.1 -1.7 -1.4 -1.0 -.6 -.5 -.6 -.6 -.8 -.8 -.5 -.3 -.5 -.8 -.9 -.7 -.9 -1.0 -1.1 -1.1 -1.6 -1.9
-.7 -.7 -.9 -.8 -.5 -.5 -.6 -.7 -.7 -.4 -.4 -.5 -.7 -.7 -.6 -.5 -.3 -.2 -.2 -.2 -.3 -.5 -.6 -.9 -.8 -.6 -.6 -.6 -.5 -.4 -.3 -.2 -.4 -.6 -.8 -.8

Figure 44. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS15 (700 hPa)
NOAA16, using all observations



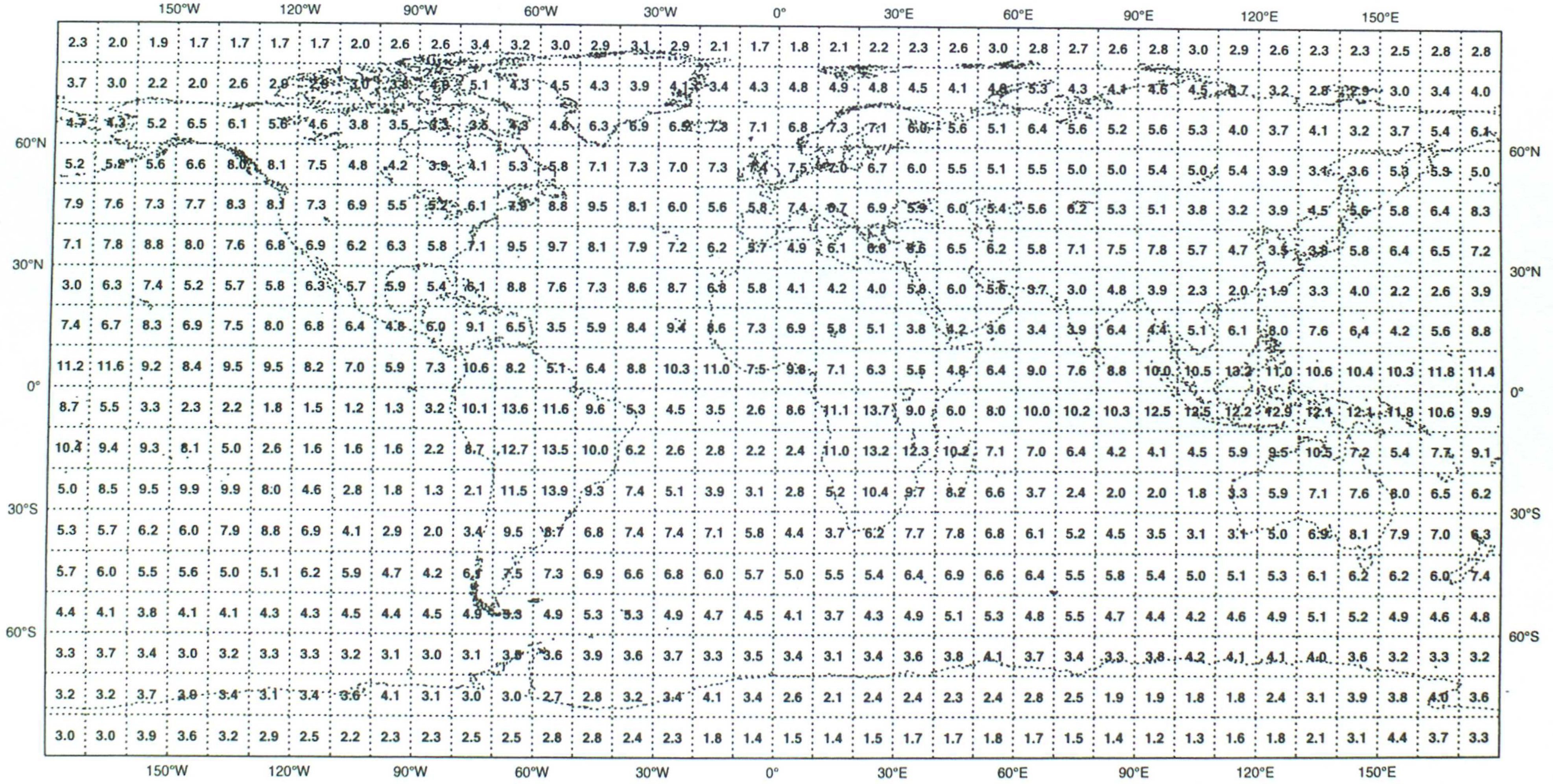
1.3	1.0	1.0	.9	.8	.8	.8	1.2	1.7	1.6	1.9	2.1	1.8	1.8	1.7	1.5	1.1	.9	1.1	1.4	1.5	1.5	1.5	1.7	1.7	1.7	1.7	1.8	1.9	1.8	1.6	1.4	1.4	1.5	1.6	1.6
2.2	1.8	1.3	1.1	1.5	1.8	2.6	2.1	2.8	3.5	3.6	3.0	3.1	2.8	2.6	2.5	2.4	3.2	3.5	3.8	3.6	3.4	2.9	3.8	3.8	3.0	2.9	3.1	2.9	2.4	1.9	1.6	1.6	1.8	2.0	2.4
3.1	2.8	3.4	4.1	4.0	3.8	3.4	2.8	2.6	2.1	2.7	3.2	3.6	4.4	5.5	5.5	5.8	5.5	5.1	5.2	5.1	4.2	3.9	3.6	4.3	3.7	3.6	3.7	3.4	2.7	2.2	2.2	1.7	2.1	2.9	3.6
3.7	3.8	4.0	5.1	6.4	6.0	5.5	3.6	3.2	2.9	3.2	4.3	4.5	5.9	6.4	5.9	6.1	6.0	6.0	6.3	4.9	4.3	4.0	3.6	3.7	3.3	3.3	3.6	3.2	3.1	2.3	1.8	2.1	3.1	3.6	3.4
6.6	6.3	6.4	6.6	7.2	6.8	5.9	5.3	4.4	4.3	5.2	6.8	7.6	8.4	7.1	5.5	4.9	4.8	6.0	5.1	5.5	4.7	4.6	3.9	4.2	4.4	3.5	3.0	2.2	1.8	2.3	3.0	4.0	4.8	5.3	7.0
6.6	7.2	7.9	7.1	6.7	6.2	5.9	4.7	5.1	4.9	6.5	8.8	9.1	7.5	7.0	6.5	5.4	5.1	4.5	5.4	6.0	3.6	5.6	5.6	5.1	5.2	5.1	5.6	4.3	3.5	3.1	3.5	5.2	5.9	6.3	6.7
2.7	6.4	7.2	4.4	4.7	4.9	5.4	4.8	5.0	4.8	5.8	8.6	7.2	7.1	7.6	7.8	6.1	5.2	3.9	3.5	3.0	4.8	5.1	5.1	2.9	2.2	3.9	3.6	1.9	1.8	2.1	3.8	4.0	2.0	2.1	4.0
5.7	5.4	7.6	5.9	6.7	7.3	6.6	6.0	4.2	5.6	8.2	5.7	3.1	5.8	8.5	9.5	8.3	6.0	5.4	4.2	3.3	2.4	3.7	2.9	2.3	2.6	5.2	3.5	3.9	4.9	6.5	6.1	5.0	3.1	4.2	7.8
8.9	9.6	8.1	7.8	9.0	8.6	7.5	6.3	5.3	6.8	8.9	6.4	4.2	6.2	8.6	9.9	10.1	6.4	8.6	5.8	5.3	5.1	4.2	5.8	7.8	7.0	7.9	8.9	9.3	11.6	9.7	9.5	9.0	8.9	9.8	10.0
7.5	4.4	2.6	1.7	1.5	1.2	1.0	.9	1.0	3.0	8.5	11.4	9.7	8.3	4.7	3.6	2.8	2.1	8.1	10.0	11.4	7.8	5.7	7.9	9.5	9.4	9.6	11.6	11.2	10.8	11.7	10.6	10.5	10.3	9.2	8.5
9.0	8.6	8.5	7.5	4.3	2.0	1.1	1.0	1.0	1.5	7.6	10.8	11.5	9.2	5.4	1.8	1.8	1.4	1.7	9.7	11.5	10.5	8.8	5.9	6.0	5.3	3.2	2.9	3.3	4.3	7.8	8.9	6.5	4.5	6.8	8.0
4.7	7.7	8.8	9.2	9.3	7.5	4.3	2.4	1.4	1.0	1.5	9.7	11.6	8.0	7.4	5.1	3.4	2.2	1.4	5.4	10.0	8.3	7.0	6.2	3.3	1.7	1.4	1.4	1.2	3.5	6.9	8.0	8.3	7.7	6.4	5.8
4.9	5.1	5.2	5.5	7.4	8.3	6.3	3.7	2.5	1.6	2.9	8.4	7.8	6.5	7.1	7.2	6.4	5.0	3.7	3.3	5.8	6.9	7.1	6.2	6.1	4.8	4.1	3.2	2.7	2.8	5.2	7.2	8.0	7.1	6.5	6.1
5.1	5.4	4.9	5.0	4.5	4.6	5.5	5.2	4.2	3.6	4.8	6.3	6.3	6.0	5.8	6.1	5.1	4.8	3.9	4.5	4.6	5.4	5.9	5.9	5.6	4.7	4.9	4.7	4.2	4.2	4.5	5.2	5.4	5.4	5.3	6.1
3.6	3.5	3.3	3.3	3.2	3.5	3.4	3.8	3.7	3.7	3.9	4.1	3.8	4.2	4.3	3.8	3.3	3.4	2.9	2.7	3.1	3.7	3.9	4.0	3.9	4.4	3.6	3.5	3.3	3.3	3.9	4.1	4.1	4.0	4.0	4.0
2.3	2.5	2.4	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.2	2.8	2.1	2.4	2.3	2.3	2.1	2.5	2.3	1.9	2.1	2.4	2.5	2.7	2.5	2.3	2.2	2.4	2.7	2.7	2.8	2.8	2.6	2.2	2.2	2.2
1.9	1.8	2.1	2.2	1.8	1.8	2.0	2.2	2.5	2.0	1.7	1.5	1.5	1.6	1.7	2.0	2.3	1.9	1.4	1.1	1.2	1.1	1.0	1.1	1.4	1.2	1.0	.9	.9	.9	1.2	1.5	1.9	1.9	2.3	2.2
1.8	1.8	2.2	2.1	1.7	1.5	1.3	1.0	1.0	1.0	.9	.9	1.2	1.2	1.1	1.0	.8	.7	.7	.7	.7	.7	.8	.8	.9	.8	.7	.7	.7	.7	.8	.9	1.0	1.5	2.3	2.1	1.9

Figure 45. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS11 (500 - 700 hPa)
NOAA16, using all observations



-3.9	-3.7	-3.5	-3.6	-3.6	-3.4	-3.2	-3.3	-3.4	-3.1	-2.7	-2.8	-2.3	-2.5	-2.4	-2.8	-2.9	-2.7	-3.3	-3.6	-3.5	-3.6	-3.8	-4.2	-3.5	-3.2	-3.5	-3.4	-3.5	-3.7	-3.6	-3.4	-3.4	-3.7	-3.8	-3.9
-3.4	-2.9	-2.5	-2.5	-3.0	-3.1	-3.7	-4.1	-4.7	-4.8	-4.2	-3.1	-3.1	-3.8	-3.3	-1.6	-3.1	-3.9	-5.0	-4.9	-4.6	-4.2	-3.9	-4.8	-4.2	-3.7	-4.8	-4.8	-4.5	-3.6	-3.2	-3.0	-3.1	-2.6	-3.1	-3.6
-4.0	-8.2	-3.5	-4.3	-4.3	-3.7	-3.2	-3.0	-3.1	-2.6	-3.1	-3.7	-5.0	-4.8	-4.7	-5.2	-5.8	-5.4	-5.4	-5.8	-4.8	-4.4	-4.5	-4.2	-5.2	-4.7	-4.9	-5.6	-5.0	-3.5	-3.1	-2.7	-2.4	-3.2	-4.4	-5.8
-4.8	-4.1	-3.9	-5.1	-6.2	-6.3	-4.2	-2.4	-2.5	-2.8	-3.2	-3.8	-4.3	-4.7	-4.8	-3.9	-3.8	-4.1	-4.3	-3.8	-3.5	-3.3	-3.1	-2.7	-2.9	-2.8	-3.5	-3.9	-3.3	-3.1	-2.3	-1.7	-2.8	-5.1	-5.2	-4.7
-5.0	-4.3	-4.3	-5.1	-5.8	-6.8	-6.0	-4.1	-2.6	-3.0	-3.7	-4.3	-4.9	-5.7	-4.6	-2.6	-2.2	-2.6	-3.5	-3.3	-3.4	-2.5	-1.9	-1.0	-1.9	-2.8	-1.3	.3	.4	.0	-.3	-1.2	-3.5	-4.5	-4.4	-5.7
-2.5	-3.3	-4.5	-4.1	-3.3	-3.0	-3.3	-2.0	-1.6	-1.6	-2.2	-3.7	-4.1	-3.1	-2.9	-2.5	-1.9	-1.6	-1.2	-2.5	-2.7	-2.8	-2.3	-1.9	-2.2	-3.0	-1.6	-2.5	-.7	.2	-.2	-1.0	-1.8	-2.1	-2.1	-3.0
1.1	-.8	-1.3	.1	-.3	-.9	-.9	-.8	-.6	-.4	-1.0	-2.5	-1.4	-1.6	-3.2	-3.2	-1.9	-.7	.0	-.2	-.2	-.8	-.2	.1	.4	1.4	1.8	.6	1.8	1.8	1.4	.3	.6	.8	1.1	.9
-1.3	-.7	-2.0	-1.2	-1.9	-3.2	-1.9	-1.5	-.8	-1.0	-1.9	-.6	.9	-.6	-3.3	-5.5	-4.5	-2.6	-2.1	-1.9	-.5	.8	1.0	1.0	1.1	1.5	.2	.6	-.5	-.4	-1.7	-1.4	-1.0	.0	-.2	-1.7
-5.0	-4.7	-2.5	-2.2	-2.9	-3.0	-1.6	-1.4	-.9	-1.5	-4.5	-2.5	-.2	-.9	-3.0	-5.3	-5.4	-2.4	-4.5	-1.4	-.6	.0	.2	-1.1	-2.6	-.5	-1.9	-5.3	-6.2	-10.2	-6.1	-5.8	-5.0	-5.2	-5.9	-6.2
-2.5	-.3	.6	.8	1.1	1.2	1.4	1.2	1.0	.1	-4.2	-9.4	-7.8	-5.2	-.5	.2	.6	1.0	-2.3	-5.6	-8.8	-2.2	-.3	-2.4	-3.9	-4.4	-3.8	-6.7	-9.2	-12.7	-9.8	-9.6	-7.8	-5.8	-5.8	-5.6
-3.1	-3.3	-3.0	-2.3	.1	1.2	1.7	1.5	1.3	1.1	-2.5	-9.3	-10.7	-6.0	-.7	1.4	1.2	1.2	1.1	-6.0	-11.2	-6.7	-3.8	-1.4	-.7	-.7	.5	.7	-.1	-1.5	-4.1	-5.2	-2.1	-.5	-1.8	-3.6
-.6	-2.4	-4.7	-5.9	-4.9	-3.2	-.1	.9	1.4	1.5	1.6	-3.2	-7.6	-4.1	-2.4	-.8	.4	1.3	1.5	.1	-4.9	-3.2	-1.6	-1.4	.4	1.4	1.5	1.5	1.6	.6	-2.1	-2.8	-2.8	-2.7	-1.5	-1.5
-.9	-.6	-1.0	-1.5	-2.9	-4.9	-3.1	-.4	.5	1.1	.9	-2.2	-3.2	-2.1	-2.3	-3.1	-2.7	-1.5	-.1	.6	-.9	-1.7	-1.8	-1.1	-1.2	-.6	-.4	.2	.5	.5	-.7	-1.6	-2.7	-2.6	-2.0	-2.0
-2.3	-2.4	-2.0	-2.0	-1.5	-1.7	-2.4	-2.2	-1.5	-1.0	-2.9	-4.1	-3.3	-3.3	-3.3	-3.1	-2.5	-2.8	-1.8	-2.3	-2.4	-2.8	-3.1	-3.1	-2.7	-2.1	-2.3	-2.3	-1.9	-1.9	-2.0	-2.2	-1.9	-2.2	-2.3	-3.1
-2.7	-2.6	-2.6	-2.4	-2.2	-2.5	-2.4	-2.6	-2.4	-2.7	-3.3	-3.5	-3.0	-3.2	-3.3	-3.4	-2.9	-3.1	-2.8	-2.6	-3.1	-3.5	-3.6	-3.5	-3.4	-4.0	-3.5	-3.4	-3.4	-3.2	-3.4	-3.4	-3.3	-3.2	-3.0	-2.9
-2.9	-3.0	-3.0	-2.8	-3.2	-3.5	-3.3	-3.2	-2.9	-2.5	-2.2	-2.8	-3.0	-3.5	-3.6	-3.1	-2.7	-2.8	-2.5	-2.6	-2.8	-2.8	-2.6	-3.1	-2.8	-2.7	-2.8	-3.3	-3.7	-3.4	-3.1	-3.0	-3.1	-2.9	-2.9	-2.9
-2.3	-2.2	-2.6	-3.1	-3.0	-3.1	-3.6	-3.5	-3.5	-2.6	-2.2	-2.6	-2.7	-2.9	-2.9	-2.4	-2.3	-1.8	-1.1	-1.2	-1.5	-1.6	-2.0	-2.1	-1.5	-1.2	-1.5	-2.1	-2.3	-2.1	-2.5	-2.8	-3.0	-2.8	-3.0	-2.7
-1.6	-1.8	-2.3	-2.1	-1.8	-1.7	-2.0	-2.5	-2.6	-2.0	-1.9	-2.3	-2.6	-2.3	-1.6	-1.4	-1.1	-.9	-.9	-1.0	-1.1	-1.6	-1.9	-2.4	-2.3	-1.9	-1.8	-1.6	-1.5	-1.4	-1.3	-1.4	-1.8	-2.2	-2.3	-2.0

Figure 46. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS11 (500 - 700 hPa)
NOAA16, using all observations



2.3	2.0	1.9	1.7	1.7	1.7	1.7	2.0	2.6	2.6	3.4	3.2	3.0	2.9	3.1	2.9	2.1	1.7	1.8	2.1	2.2	2.3	2.6	3.0	2.8	2.7	2.6	2.8	3.0	2.9	2.6	2.3	2.3	2.5	2.8	2.8
3.7	3.0	2.2	2.0	2.6	2.9	2.8	3.0	3.8	4.9	5.1	4.3	4.5	4.3	3.9	4.1	3.4	4.3	4.8	4.9	4.8	4.5	4.1	4.8	5.3	4.3	4.4	4.6	4.5	3.7	3.2	2.8	2.9	3.0	3.4	4.0
4.7	4.3	5.2	6.5	6.1	5.6	4.6	3.8	3.5	4.3	3.5	4.3	4.8	6.3	6.9	6.9	7.3	7.1	6.8	7.3	7.1	6.0	5.6	5.1	6.4	5.6	5.2	5.6	5.3	4.0	3.7	4.1	3.2	3.7	5.4	6.1
5.2	5.2	5.6	6.6	8.0	8.1	7.5	4.8	4.2	3.9	4.1	5.3	5.8	7.1	7.3	7.0	7.3	7.4	7.5	7.0	6.7	6.0	5.5	5.1	5.5	5.0	5.0	5.4	5.0	5.4	3.9	3.4	3.6	5.3	5.9	5.0
7.9	7.6	7.3	7.7	8.3	8.1	7.3	6.9	5.5	5.2	6.1	7.9	8.8	9.5	8.1	6.0	5.6	5.8	7.4	6.7	6.9	5.9	6.0	5.4	5.6	6.2	5.3	5.1	3.8	3.2	3.9	4.5	5.6	5.8	6.4	8.3
7.1	7.8	8.8	8.0	7.6	6.8	6.9	6.2	6.3	5.8	7.1	9.5	9.7	8.1	7.9	7.2	6.2	5.7	4.9	6.1	6.6	6.6	6.5	6.2	5.8	7.1	7.5	7.8	5.7	4.7	3.5	3.8	5.8	6.4	6.5	7.2
3.0	6.3	7.4	5.2	5.7	5.8	6.3	5.7	5.9	5.4	6.1	8.8	7.6	7.3	8.6	8.7	6.8	5.8	4.1	4.2	4.0	5.8	6.0	5.6	3.7	3.0	4.8	3.9	2.3	2.0	1.9	3.3	4.0	2.2	2.6	3.9
7.4	6.7	8.3	6.9	7.5	8.0	6.8	6.4	4.8	6.0	9.1	6.5	3.5	5.9	8.4	9.4	8.6	7.3	6.9	5.8	5.1	3.8	4.2	3.6	3.4	3.9	6.4	4.4	5.1	6.1	8.0	7.6	6.4	4.2	5.6	8.8
11.2	11.6	9.2	8.4	9.5	9.5	8.2	7.0	5.9	7.3	10.6	8.2	5.1	6.4	8.8	10.3	11.0	7.5	9.8	7.1	6.3	5.5	4.8	6.4	9.0	7.6	8.8	10.0	10.5	13.2	11.0	10.6	10.4	10.3	11.8	11.4
8.7	5.5	3.3	2.3	2.2	1.8	1.5	1.2	1.3	3.2	10.1	13.6	11.6	9.6	5.3	4.5	3.5	2.6	8.6	11.1	13.7	9.0	6.0	8.0	10.0	10.2	10.3	12.5	12.5	12.2	12.9	12.1	12.1	11.8	10.6	9.9
10.4	9.4	9.3	8.1	5.0	2.6	1.6	1.6	1.6	2.2	8.7	12.7	13.5	10.0	6.2	2.6	2.8	2.2	2.4	11.0	13.2	12.3	10.2	7.1	7.0	6.4	4.2	4.1	4.5	5.9	9.5	10.5	7.2	5.4	7.7	9.1
5.0	8.5	9.5	9.9	9.9	8.0	4.6	2.8	1.8	1.3	2.1	11.5	13.9	9.3	7.4	5.1	3.9	3.1	2.8	5.2	10.4	9.7	8.2	6.6	3.7	2.4	2.0	2.0	1.8	3.3	5.9	7.1	7.6	8.0	6.5	6.2
5.3	5.7	6.2	6.0	7.9	8.8	6.9	4.1	2.9	2.0	3.4	9.5	8.7	6.8	7.4	7.4	7.1	5.8	4.4	3.7	6.2	7.7	7.8	6.8	6.1	5.2	4.5	3.5	3.1	3.1	5.0	6.9	8.1	7.9	7.0	6.3
5.7	6.0	5.5	5.6	5.0	5.1	6.2	5.9	4.7	4.2	6.1	7.5	7.3	6.9	6.6	6.8	6.0	5.7	5.0	5.5	5.4	6.4	6.9	6.6	6.4	5.5	5.8	5.4	5.0	5.1	5.3	6.1	6.2	6.2	6.0	7.4
4.4	4.1	3.8	4.1	4.1	4.3	4.3	4.5	4.4	4.5	4.9	5.3	4.9	5.3	5.3	4.9	4.7	4.5	4.1	3.7	4.3	4.9	5.1	5.3	4.8	5.5	4.7	4.4	4.2	4.6	4.9	5.1	5.2	4.9	4.6	4.8
3.3	3.7	3.4	3.0	3.2	3.3	3.3	3.2	3.1	3.0	3.1	3.8	3.6	3.9	3.6	3.7	3.3	3.5	3.4	3.1	3.4	3.6	3.8	4.1	3.7	3.4	3.3	3.8	4.2	4.1	4.1	4.0	3.6	3.2	3.3	3.2
3.2	3.2	3.7	3.9	3.4	3.1	3.4	3.6	4.1	3.1	3.0	3.0	2.7	2.8	3.2	3.4	4.1	3.4	2.6	2.1	2.4	2.4	2.3	2.4	2.8	2.5	1.9	1.9	1.8	1.8	2.4	3.1	3.9	3.8	4.0	3.6
3.0	3.0	3.9	3.6	3.2	2.9	2.5	2.2	2.3	2.3	2.5	2.5	2.8	2.8	2.4	2.3	1.8	1.4	1.5	1.4	1.5	1.7	1.7	1.8	1.7	1.5	1.4	1.2	1.3	1.6	1.8	2.1	3.1	4.4	3.7	3.3

Figure 47. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS4 (400 hPa)
NOAA16, using all observations

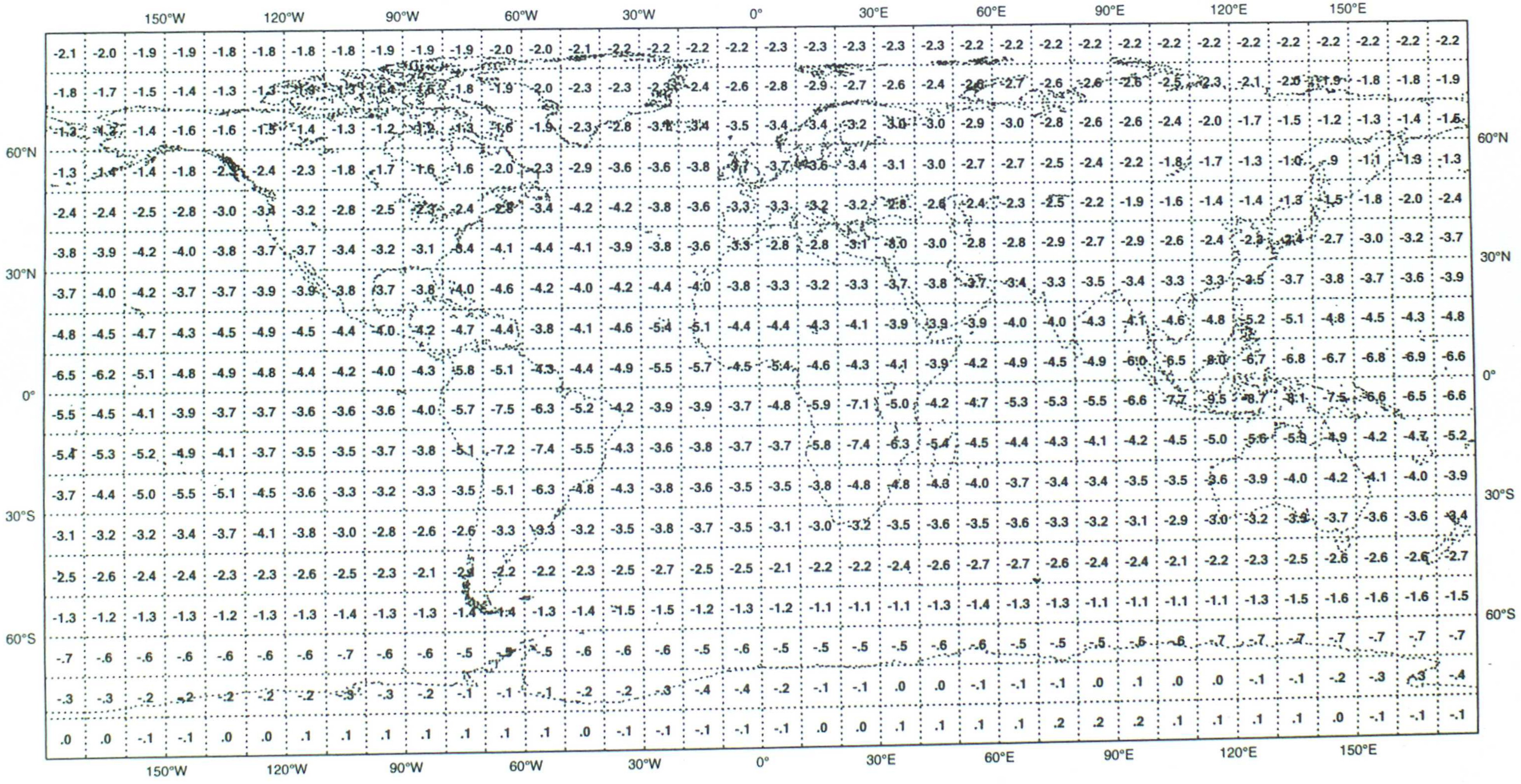

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
-2.1 -2.0 -1.9 -1.9 -1.8 -1.8 -1.8 -1.8 -1.9 -1.9 -1.9 -2.0 -2.0 -2.1 -2.2 -2.2 -2.2 -2.2 -2.3 -2.3 -2.3 -2.3 -2.3 -2.2 -2.2 -2.2 -2.2 -2.2 -2.2 -2.2 -2.2 -2.2 -2.2 -2.2 -2.2 -2.2
-1.8 -1.7 -1.5 -1.4 -1.3 -1.3 -1.3 -1.3 -1.4 -1.6 -1.8 -1.9 -2.0 -2.3 -2.3 -2.3 -2.4 -2.6 -2.8 -2.9 -2.7 -2.6 -2.4 -2.6 -2.7 -2.6 -2.6 -2.6 -2.5 -2.3 -2.1 -2.0 -1.9 -1.8 -1.8 -1.9
-1.3 -1.2 -1.4 -1.6 -1.6 -1.5 -1.4 -1.3 -1.2 -1.2 -1.3 -1.6 -1.9 -2.3 -2.8 -3.1 -3.4 -3.5 -3.4 -3.4 -3.2 -3.0 -3.0 -2.9 -3.0 -2.8 -2.6 -2.6 -2.4 -2.0 -1.7 -1.5 -1.2 -1.3 -1.4 -1.5
-1.3 -1.4 -1.4 -1.8 -2.2 -2.4 -2.3 -1.8 -1.7 -1.6 -1.6 -2.0 -2.3 -2.9 -3.6 -3.6 -3.8 -3.7 -3.7 -3.6 -3.4 -3.1 -3.0 -2.7 -2.7 -2.5 -2.4 -2.2 -1.8 -1.7 -1.3 -1.0 -.9 -1.1 -1.3 -1.3
-2.4 -2.4 -2.5 -2.8 -3.0 -3.4 -3.2 -2.8 -2.5 -2.3 -2.4 -2.8 -3.4 -4.2 -4.2 -3.8 -3.6 -3.3 -3.3 -3.2 -3.2 -2.8 -2.6 -2.4 -2.3 -2.5 -2.2 -1.9 -1.6 -1.4 -1.4 -1.3 -1.5 -1.8 -2.0 -2.4
-3.8 -3.9 -4.2 -4.0 -3.8 -3.7 -3.7 -3.4 -3.2 -3.1 -3.4 -4.1 -4.4 -4.1 -3.9 -3.8 -3.6 -3.3 -2.8 -2.8 -3.1 -3.0 -3.0 -2.8 -2.8 -2.9 -2.7 -2.9 -2.6 -2.4 -2.3 -2.4 -2.7 -3.0 -3.2 -3.7
-3.7 -4.0 -4.2 -3.7 -3.7 -3.9 -3.9 -3.8 -3.7 -3.8 -4.0 -4.6 -4.2 -4.0 -4.2 -4.4 -4.0 -3.8 -3.3 -3.2 -3.3 -3.7 -3.8 -3.7 -3.4 -3.3 -3.5 -3.4 -3.3 -3.3 -3.5 -3.7 -3.8 -3.7 -3.6 -3.9
-4.8 -4.5 -4.7 -4.3 -4.5 -4.9 -4.5 -4.4 -4.0 -4.2 -4.7 -4.4 -3.8 -4.1 -4.6 -5.4 -5.1 -4.4 -4.4 -4.3 -4.1 -3.9 -3.9 -3.9 -4.0 -4.0 -4.3 -4.1 -4.6 -4.8 -5.2 -5.1 -4.8 -4.5 -4.3 -4.8
-6.5 -6.2 -5.1 -4.8 -4.9 -4.8 -4.4 -4.2 -4.0 -4.3 -5.8 -5.1 -4.3 -4.4 -4.9 -5.5 -5.7 -4.5 -5.4 -4.6 -4.3 -4.1 -3.9 -4.2 -4.9 -4.5 -4.9 -6.0 -6.5 -8.0 -6.7 -6.8 -6.7 -6.8 -6.9 -6.6
-5.5 -4.5 -4.1 -3.9 -3.7 -3.7 -3.6 -3.6 -3.6 -4.0 -5.7 -7.5 -6.3 -5.2 -4.2 -3.9 -3.9 -3.7 -4.8 -5.9 -7.1 -5.0 -4.2 -4.7 -5.3 -5.3 -5.5 -6.6 -7.7 -9.5 -8.7 -8.1 -7.5 -6.6 -6.5 -6.6
-5.4 -5.3 -5.2 -4.9 -4.1 -3.7 -3.5 -3.5 -3.7 -3.8 -5.1 -7.2 -7.4 -5.5 -4.3 -3.6 -3.8 -3.7 -3.7 -5.8 -7.4 -6.3 -5.4 -4.5 -4.4 -4.3 -4.1 -4.2 -4.5 -5.0 -5.6 -5.9 -4.9 -4.2 -4.7 -5.2
-3.7 -4.4 -5.0 -5.5 -5.1 -4.5 -3.6 -3.3 -3.2 -3.3 -3.5 -5.1 -6.3 -4.8 -4.3 -3.8 -3.6 -3.5 -3.5 -3.8 -4.8 -4.8 -4.8 -4.0 -3.7 -3.4 -3.4 -3.5 -3.5 -3.6 -3.9 -4.0 -4.2 -4.1 -4.0 -3.9
-3.1 -3.2 -3.2 -3.4 -3.7 -4.1 -3.8 -3.0 -2.8 -2.6 -2.6 -3.3 -3.3 -3.2 -3.5 -3.8 -3.7 -3.5 -3.1 -3.0 -3.2 -3.5 -3.6 -3.5 -3.6 -3.3 -3.2 -3.1 -2.9 -3.0 -3.2 -3.9 -3.7 -3.6 -3.6 -3.4
-2.5 -2.6 -2.4 -2.4 -2.3 -2.3 -2.6 -2.5 -2.3 -2.1 -2.1 -2.2 -2.2 -2.3 -2.5 -2.7 -2.5 -2.5 -2.1 -2.2 -2.2 -2.4 -2.6 -2.7 -2.7 -2.6 -2.4 -2.4 -2.1 -2.2 -2.3 -2.5 -2.6 -2.6 -2.6 -2.7
-1.3 -1.2 -1.3 -1.3 -1.2 -1.3 -1.3 -1.4 -1.3 -1.3 -1.4 -1.4 -1.3 -1.4 -1.5 -1.5 -1.2 -1.3 -1.2 -1.1 -1.1 -1.1 -1.3 -1.4 -1.3 -1.3 -1.1 -1.1 -1.1 -1.1 -1.3 -1.5 -1.6 -1.6 -1.6 -1.5
-.7 -.6 -.6 -.6 -.6 -.6 -.6 -.7 -.6 -.6 -.5 -.5 -.5 -.6 -.6 -.6 -.5 -.6 -.5 -.5 -.5 -.5 -.6 -.6 -.5 -.5 -.5 -.5 -.6 -.7 -.7 -.7 -.7 -.7 -.7 -.7
-.3 -.3 -.2 -.2 -.2 -.2 -.2 -.3 -.3 -.2 -.1 -.1 -.1 -.2 -.2 -.3 -.4 -.4 -.2 -.1 -.1 .0 .0 -.1 -.1 -.1 .0 .1 .0 .0 -.1 -.1 -.2 -.3 -.3 -.4
.0 .0 -.1 -.1 .0 .0 .1 .1 .1 .1 .1 .1 .1 .0 -.1 -.1 -.1 -.1 -.1 .0 .0 .1 .1 .1 .1 .2 .2 .2 .1 .1 .1 .1 .0 -.1 -.1 -.1

Figure 48. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: HIRS4 (400 hPa)
NOAA16, using all observations

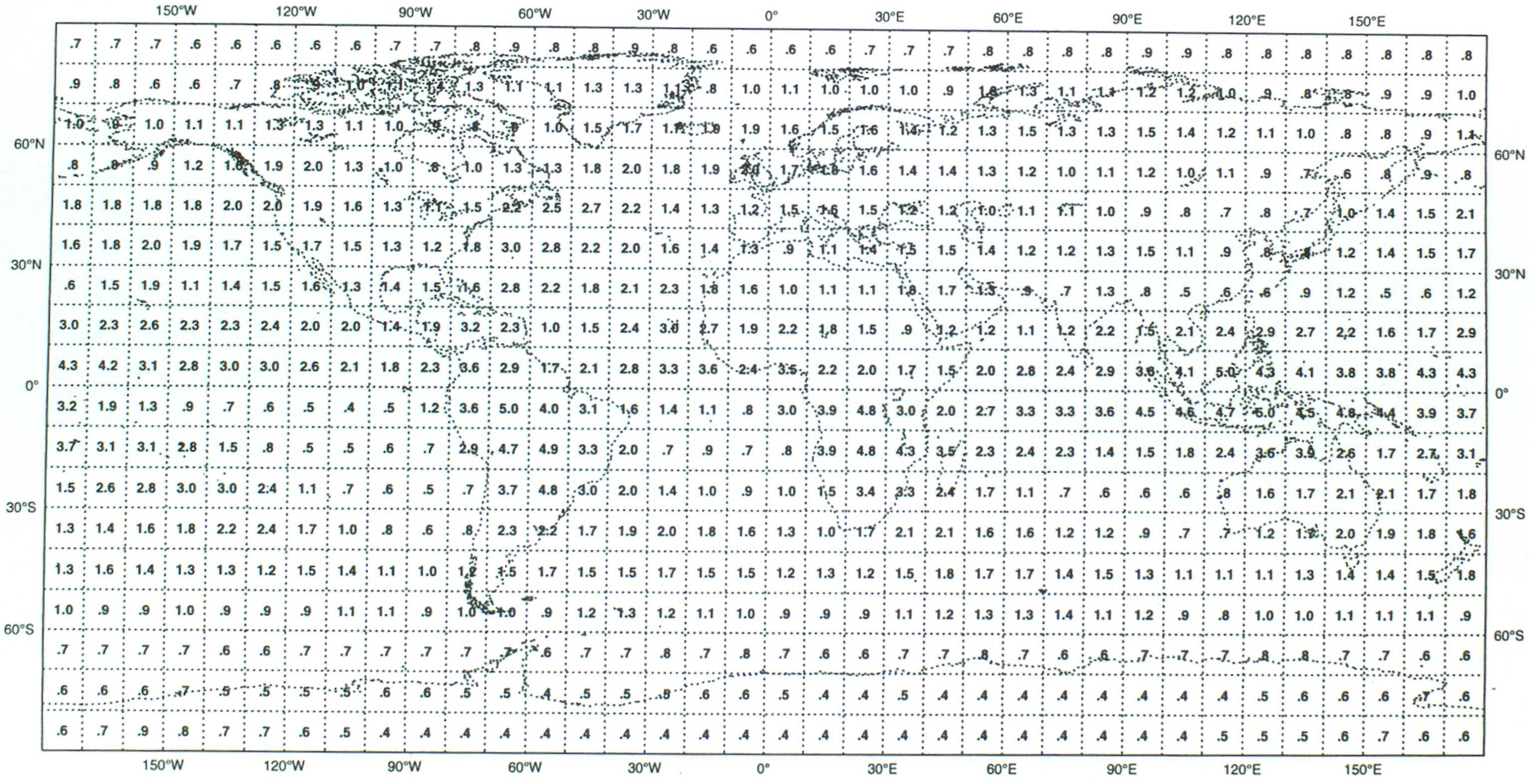

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

Figure 49. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-5 (700 hPa)
NOAA16, using all observations

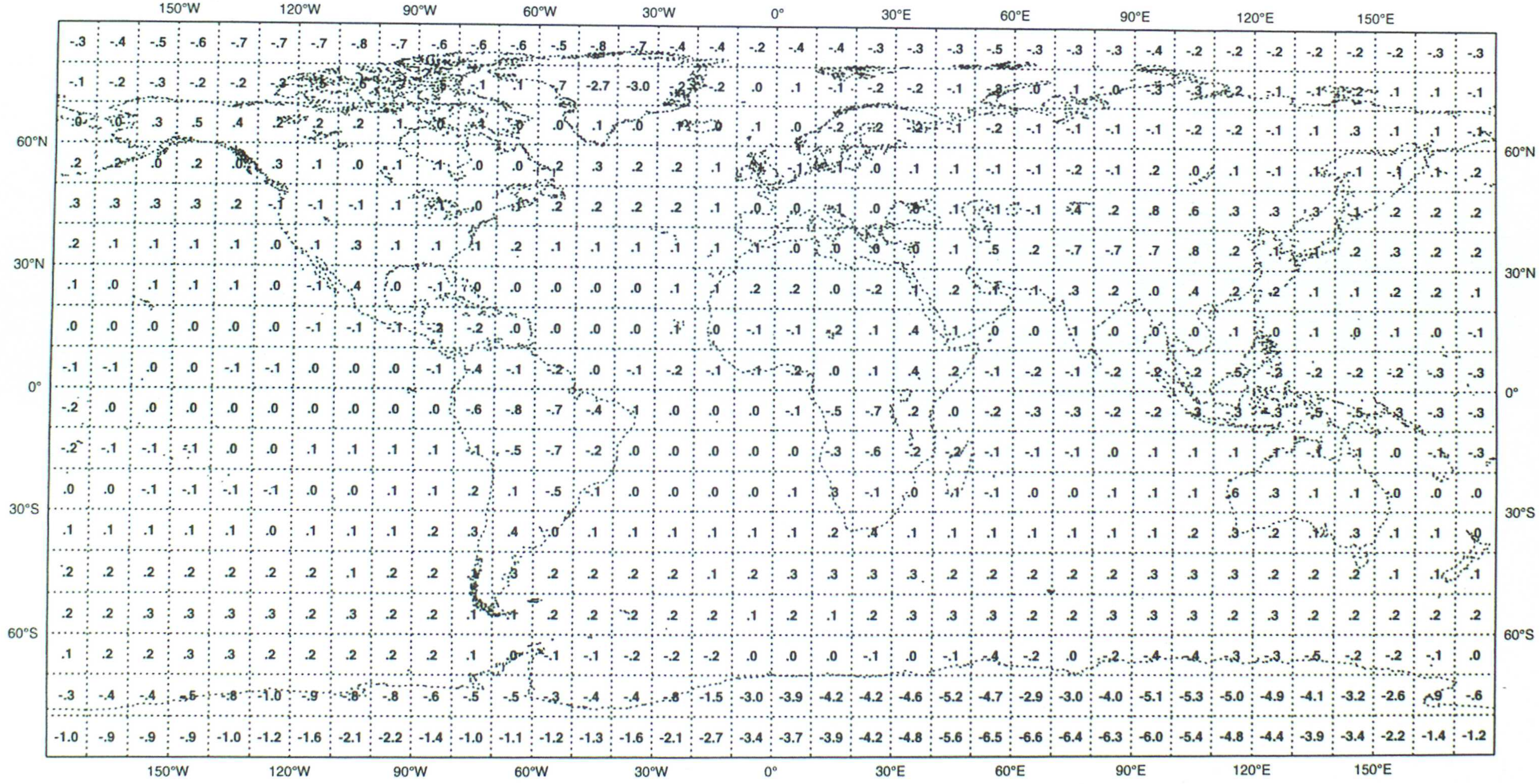

150°W 120°W 90°W 60°W 30°W 0° 30°E 60°E 90°E 120°E 150°E
60°N 30°N 0° 30°S 60°S
-.3 -.4 -.5 -.6 -.7 -.7 -.7 -.8 -.7 -.6 -.6 -.6 -.5 -.8 -.7 -.4 -.4 -.2 -.4 -.4 -.3 -.3 -.3 -.5 -.3 -.3 -.3 -.4 -.2 -.2 -.2 -.2 -.2 -.2 -.3 -.3
-.1 -.2 -.3 -.2 -.2 -.3 .5 .6 [illegible] .5 -.1 .1 -.7 -2.7 -3.0 -.2 -.2 .0 .1 -.1 -.2 -.2 -.1 -.3 .0 .1 .0 -.3 -.3 .2 -.1 -.1 .2 .1 .1 -.1
.0 .0 .3 .5 .4 .2 .2 .2 .1 .0 .1 .0 .0 .1 .0 .1 .0 .1 .0 -.2 -.2 -.2 -.1 -.2 -.1 -.1 -.1 -.1 -.2 -.2 -.1 .1 .3 .1 .1 -.1
.2 .2 .0 .2 .0 .3 .1 .0 .1 .1 .0 .0 .2 .3 .2 .2 .1 [illegible] -.1 -.1 .0 .1 .1 -.1 -.1 -.2 -.1 .2 .0 .1 -.1 .1 -.1 -.1 .1 .2
.3 .3 .3 .3 .2 -.1 -.1 -.1 .1 .1 .0 .1 .2 .2 .2 .2 .1 .0 .0 -.1 .0 .0 .1 -.1 -.1 .4 .2 .8 .6 .3 .3 .3 .1 .2 .2 .2
.2 .1 .1 .1 .1 .0 .1 .3 .1 .1 .1 .2 .1 .1 .1 .1 .1 .1 .0 .0 .0 .0 .1 .5 .2 -.7 -.7 .7 .8 .2 .1 .1 .2 .3 .2 .2
.1 .0 .1 .1 .1 .0 -.1 .4 .0 -.1 .0 .0 .0 .0 .0 .1 .1 .2 .2 .0 -.2 .1 .2 .1 .1 .3 .2 .0 .4 .2 .2 .1 .1 .2 .2 .1
.0 .0 .0 .0 .0 .0 -.1 -.1 -.1 -.2 -.2 .0 .0 .0 .0 .1 .0 -.1 -.1 .2 .1 .4 .1 .0 .0 .1 .0 .0 .0 .1 .0 .1 .0 .1 .0 -.1
-.1 -.1 .0 .0 -.1 -.1 .0 .0 .0 -.1 -.4 -.1 -.2 .0 -.1 -.2 -.1 -.1 -.2 .0 .1 .4 .2 -.1 -.2 -.1 -.2 -.2 -.2 -.5 -.3 -.2 -.2 -.2 -.3 -.3
-.2 .0 .0 .0 .0 .0 .0 .0 .0 .0 -.6 -.8 -.7 -.4 -.1 .0 .0 .0 -.1 -.5 -.7 .2 .0 -.2 -.3 -.3 -.2 -.2 -.3 -.3 -.3 -.5 -.5 -.3 -.3 -.3
-.2 -.1 -.1 -.1 .0 .0 .1 .1 .1 .1 -.1 -.5 -.7 -.2 .0 .0 .0 .0 .0 -.3 -.6 -.2 -.2 -.1 -.1 -.1 .0 .1 .1 .1 .1 -.1 -.1 .0 -.1 -.3
.0 .0 -.1 -.1 -.1 -.1 .0 .0 .1 .1 .2 .1 -.5 -.1 .0 .0 .0 .0 .1 .3 -.1 .0 .1 -.1 .0 .0 .1 .1 .1 .6 .3 .1 .1 .0 .0 .0
.1 .1 .1 .1 .1 .0 .1 .1 .1 .2 .3 .4 .0 .1 .1 .1 .1 .1 .1 .2 .4 .1 .1 .1 .1 .1 .1 .1 .2 .3 .2 .1 .3 .1 .1 .0
.2 .2 .2 .2 .2 .2 .2 .1 .2 .2 .1 .3 .2 .2 .2 .2 .1 .2 .3 .3 .3 .3 .2 .2 .2 .2 .2 .3 .3 .3 .2 .2 .2 .1 .1 .1
.2 .2 .3 .3 .3 .3 .2 .3 .2 .2 .1 .1 .2 .2 .2 .2 .2 .1 .2 .1 .2 .3 .3 .3 .2 .2 .3 .3 .3 .2 .3 .2 .2 .2 .2 .2
.1 .2 .2 .3 .3 .2 .2 .2 .2 .2 .1 .0 -.1 -.1 -.2 -.2 -.2 .0 .0 .0 -.1 .0 -.1 -.4 -.2 .0 -.2 -.4 -.4 -.3 -.3 -.5 -.2 -.2 -.1 .0
-.3 -.4 -.4 -.5 -.8 -1.0 -.9 -.8 -.8 -.6 -.5 -.5 -.3 -.4 -.4 -.8 -1.5 -3.0 -3.9 -4.2 -4.2 -4.6 -5.2 -4.7 -2.9 -3.0 -4.0 -5.1 -5.3 -5.0 -4.9 -4.1 -3.2 -2.6 -.9 -.6
-1.0 -.9 -.9 -.9 -1.0 -1.2 -1.6 -2.1 -2.2 -1.4 -1.0 -1.1 -1.2 -1.3 -1.6 -2.1 -2.7 -3.4 -3.7 -3.9 -4.2 -4.8 -5.6 -6.5 -6.6 -6.4 -6.3 -6.0 -5.4 -4.8 -4.4 -3.9 -3.4 -2.2 -1.4 -1.2

Figure 50. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-5 (700 hPa)
NOAA16, using all observations

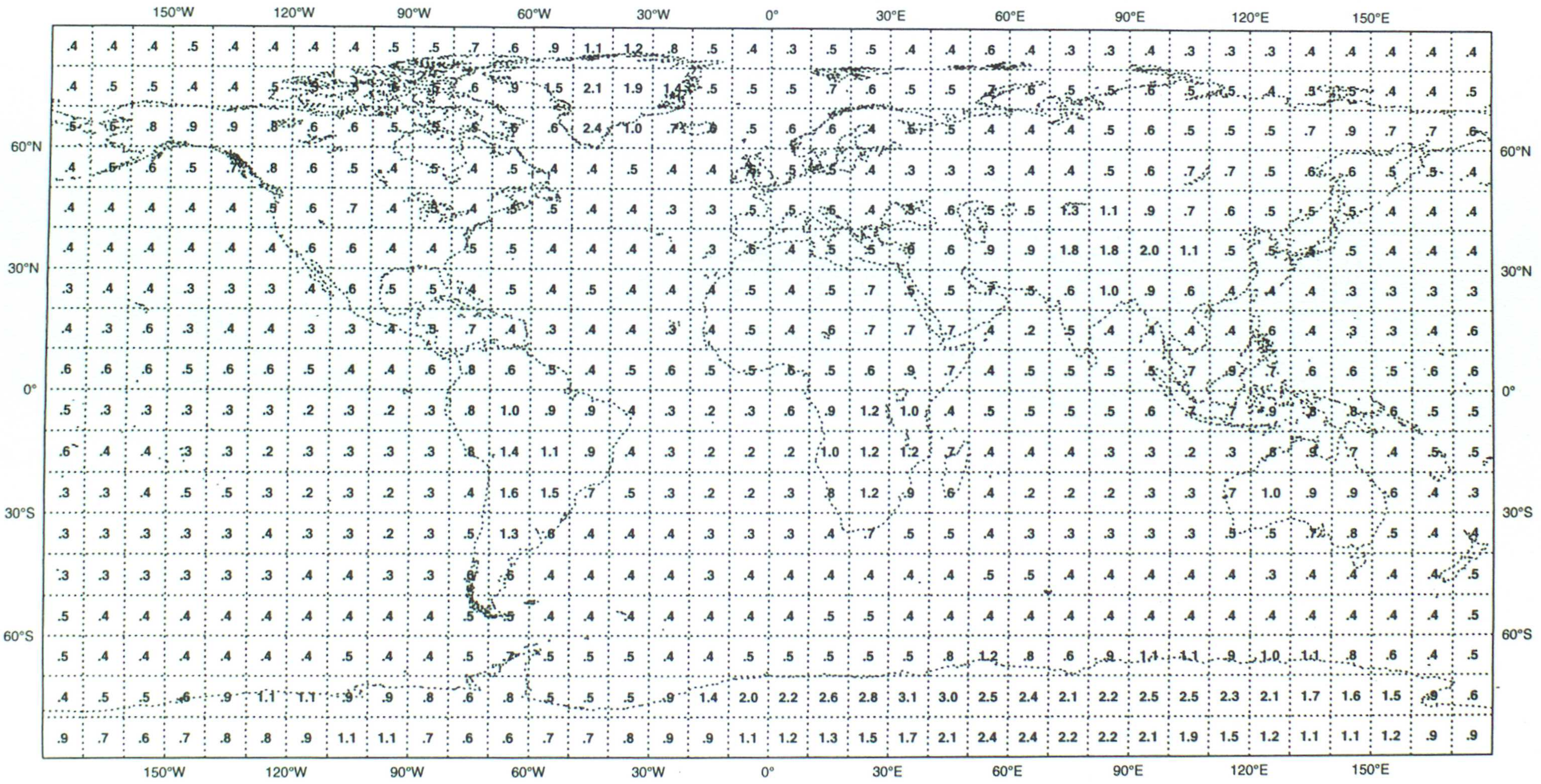

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S
.4 .4 .4 .5 .4 .4 .4 .4 .5 .5 .7 .6 .9 1.1 1.2 .8 .5 .4 .3 .5 .5 .4 .4 .6 .4 .3 .3 .4 .3 .3 .3 .4 .4 .4 .4 .4
.4 .5 .5 .4 .4 .5 .5 .5 .6 .5 .6 .9 1.5 2.1 1.9 1.4 .5 .5 .5 .7 .6 .5 .5 .7 .6 .5 .5 .6 .5 .5 .4 .5 .5 .4 .4 .5
.5 .6 .8 .9 .9 .8 .6 .6 .5 .5 .5 .6 .6 2.4 1.0 .7 .6 .5 .6 .6 .4 .5 .5 .4 .4 .4 .5 .6 .5 .5 .5 .7 .9 .7 .7 .6
.4 .5 .6 .5 .7 .8 .6 .5 .4 .5 .4 .5 .4 .4 .5 .4 .4 .5 .5 .5 .4 .3 .3 .3 .4 .4 .5 .6 .7 .7 .5 .6 .6 .5 .5 .4
.4 .4 .4 .4 .4 .5 .6 .7 .4 .5 .4 .5 .5 .4 .4 .3 .3 .5 .5 .6 .4 .5 .6 .5 .5 1.3 1.1 .9 .7 .6 .5 .5 .5 .4 .4 .4
.4 .4 .4 .4 .4 .4 .6 .6 .4 .4 .5 .5 .4 .4 .4 .4 .3 .6 .4 .5 .5 .6 .6 .9 .9 1.8 1.8 2.0 1.1 .5 .5 .4 .5 .4 .4 .4
.3 .4 .4 .3 .3 .3 .4 .6 .5 .5 .4 .5 .4 .5 .4 .4 .4 .5 .4 .5 .7 .5 .5 .7 .5 .6 1.0 .9 .6 .4 .4 .4 .3 .3 .3 .3
.4 .3 .6 .3 .4 .4 .3 .3 .4 .3 .7 .4 .3 .4 .4 .3 .4 .5 .4 .6 .7 .7 .7 .4 .2 .5 .4 .4 .4 .4 .6 .4 .3 .3 .4 .6
.6 .6 .6 .5 .6 .6 .5 .4 .4 .6 .8 .6 .5 .4 .5 .6 .5 .5 .6 .5 .6 .9 .7 .4 .5 .5 .5 .5 .7 .9 .7 .6 .6 .5 .6 .6
.5 .3 .3 .3 .3 .3 .2 .3 .2 .3 .8 1.0 .9 .9 .4 .3 .2 .3 .6 .9 1.2 1.0 .4 .5 .5 .5 .5 .6 .7 .7 .9 .8 .8 .6 .5 .5
.6 .4 .4 .3 .3 .2 .3 .3 .3 .3 .8 1.4 1.1 .9 .4 .3 .2 .2 .2 1.0 1.2 1.2 .7 .4 .4 .4 .3 .3 .2 .3 .8 .9 .7 .4 .5 .5
.3 .3 .4 .5 .5 .3 .2 .3 .2 .3 .4 1.6 1.5 .7 .5 .3 .2 .2 .3 .8 1.2 .9 .6 .4 .2 .2 .2 .3 .3 .7 1.0 .9 .9 .6 .4 .3
.3 .3 .3 .3 .3 .4 .3 .3 .2 .3 .5 1.3 .6 .4 .4 .4 .3 .3 .3 .4 .7 .5 .5 .4 .3 .3 .3 .3 .3 .5 .5 .7 .8 .5 .4 .4
.3 .3 .3 .3 .3 .3 .4 .4 .3 .3 .6 .6 .4 .4 .4 .4 .3 .4 .4 .4 .4 .4 .4 .5 .5 .4 .4 .4 .4 .4 .3 .4 .4 .4 .4 .5
.5 .4 .4 .4 .4 .4 .4 .4 .4 .4 .5 .5 .4 .4 .4 .4 .4 .4 .4 .5 .5 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .5
.5 .4 .4 .4 .4 .4 .4 .5 .4 .4 .5 .7 .5 .5 .5 .4 .4 .5 .5 .5 .5 .5 .8 1.2 .8 .6 .9 1.1 1.1 .9 1.0 1.1 .8 .6 .4 .5
.4 .5 .5 .6 .9 1.1 1.1 .9 .9 .8 .6 .8 .5 .5 .5 .9 1.4 2.0 2.2 2.6 2.8 3.1 3.0 2.5 2.4 2.1 2.2 2.5 2.5 2.3 2.1 1.7 1.6 1.5 .9 .6
.9 .7 .6 .7 .8 .8 .9 1.1 1.1 .7 .6 .6 .7 .7 .8 .9 .9 1.1 1.2 1.3 1.5 1.7 2.1 2.4 2.4 2.2 2.2 2.1 1.9 1.5 1.2 1.1 1.1 1.2 .9 .9

Figure 51. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-7 (300 hPa)
NOAA16, using all observations

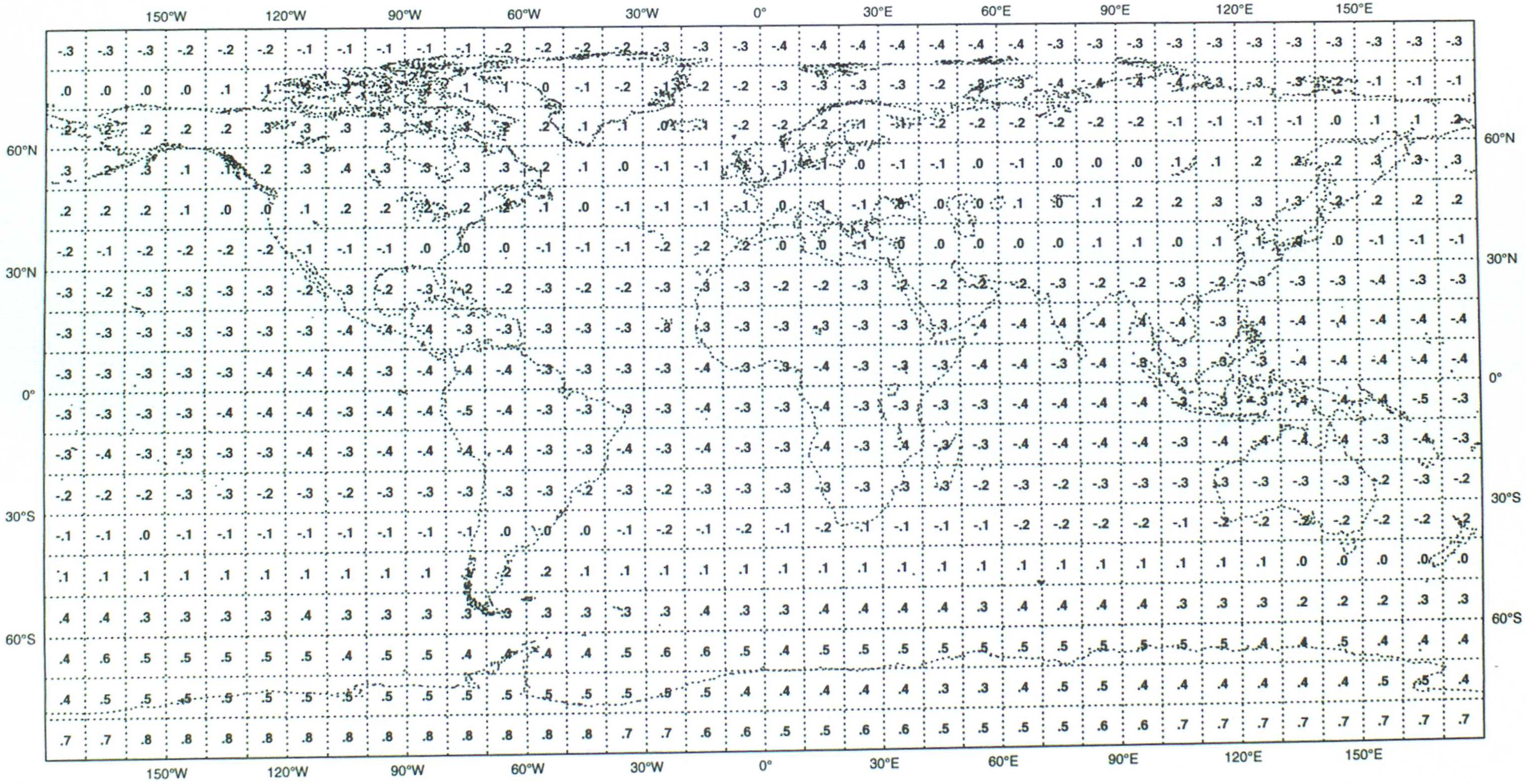

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

Figure 52. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-7 (300 hPa)
NOAA16, using all observations

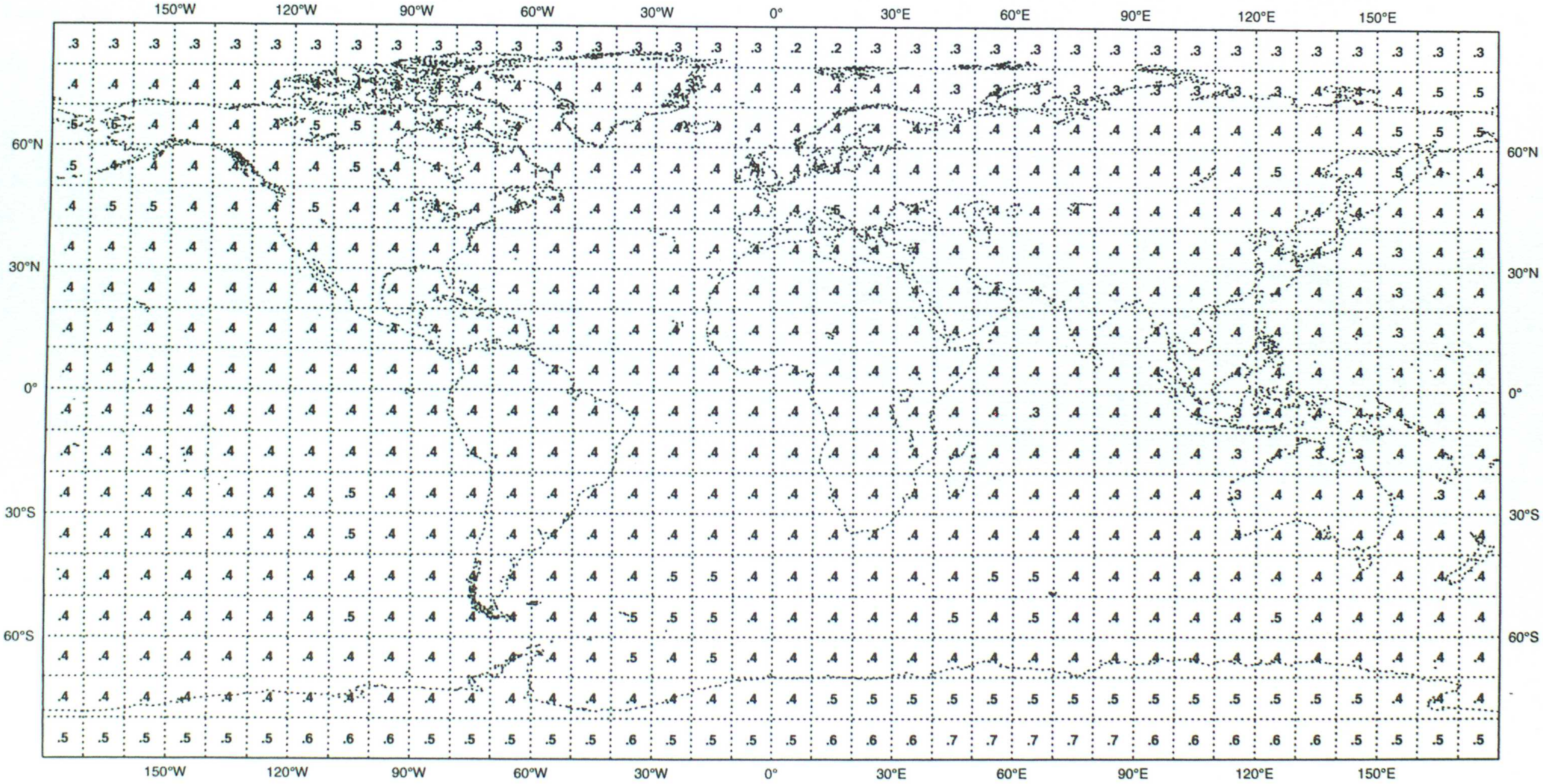

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

Figure 53. ATOVS MEAN O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-9 (100 hPa)
NOAA16, using all observations

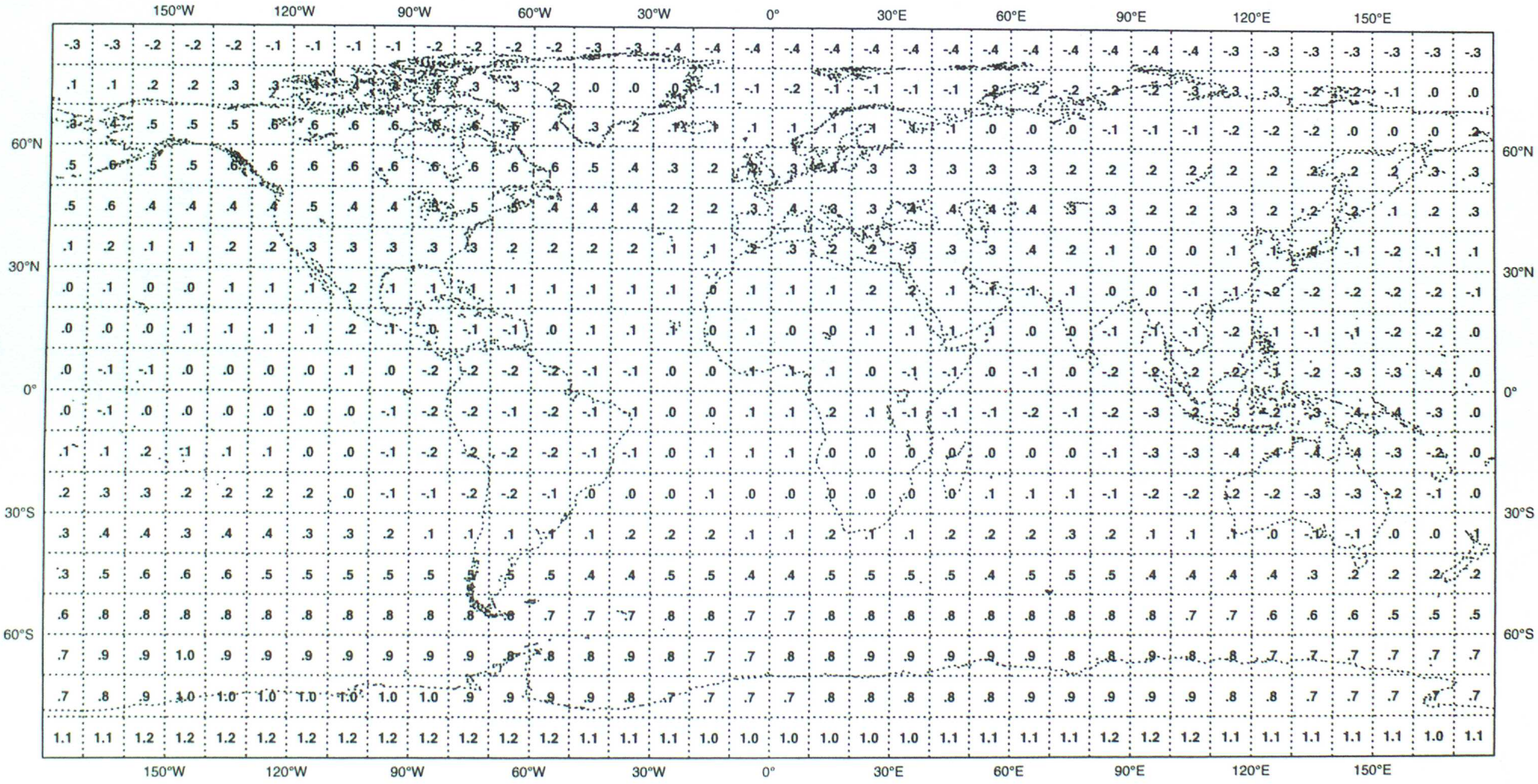

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

Figure 54. ATOVS SD O-B brightness temperature differences (deg C). DECEMBER 2003
Channel: AMSUA-9 (100 hPa)
NOAA16, using all observations

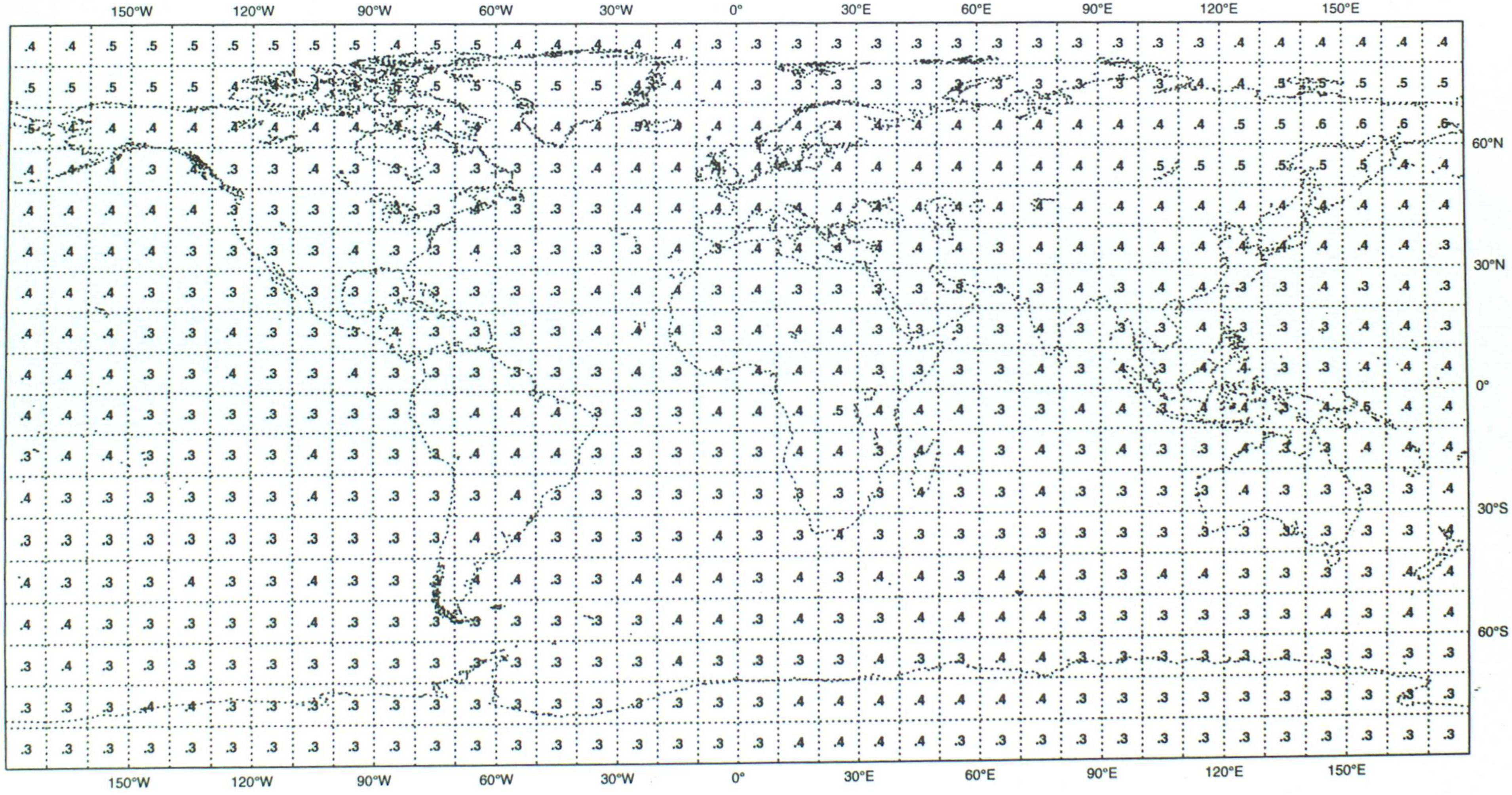

150°W
120°W
90°W
60°W
30°W
0°
30°E
60°E
90°E
120°E
150°E
60°N
30°N
0°
30°S
60°S

TABLE 8

MONTHLY MONITORING OF MARINE SURFACE OBSERVATIONS (COSNA)
DATA TYPE:- DRIFTER
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from each unique identifier for drifting buoy.

Area monitored :10°N - 80°N, 85°W - 0°W

Standard of comparison :Background field from UKMO global model.

Position :Average latitude and longitude for period.

Observation times :All hours combined.

Elements monitored
:Mean sea-level pressure (hPa)
:Wind speed ($m\ s^{-1}$)
:Wind direction (degrees)

Parameters monitored

:NOBS :Number of observations received excluding duplicates.

:NGE :Number of observations with gross errors.

:PGE :Percentage of observations with gross errors.

:SD :SD of difference of observations from background values excluding those with gross errors.

:BIAS :Mean difference of observations from background values excluding those with gross errors.
N.B. A positive bias indicates the wind observation is veered to the background

:RMS :Root Mean Square difference of observations from background values excluding those with gross errors

GROSS ERROR LIMITS
:15 hPa (pressure)
:25 $m\ s^{-1}$ (Vector Wind)

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 $m\ s^{-1}$

IDENTIFIER	LAT.	LONG.	ELEM	NOBS	PGE	%REJ	SD	BIAS	RMS
13531	25.2	-21.7	P	60	0	0	0.7	-0.2	0.7
13532	30.6	-13.1	P	60	0	0	0.6	0.1	0.6
13533	21.8	-27.2	P	42	0	0	0.7	0.1	0.7
13600	18.4	-34.1	P	599	0	20	0.7	0.8	1.0
13602	18.9	-36.0	P	462	0	3	0.6	0.2	0.6
41502	18.6	-74.1	P	136	8	86	5.7	2.9	6.4
41504	17.5	-67.6	P	1148	0	69	0.8	1.5	1.7
41520	10.4	-42.7	P	1114	0	70	0.6	1.4	1.6
41521	16.9	-51.2	P	659	0	100	0.5	-1.7	1.8
41532	23.1	-67.3	P	571	0	5	1.0	0.2	1.0
41534	26.1	-63.3	P	670	0	20	0.7	-0.1	0.7
41590	21.5	-62.9	P	551	0	3	0.8	1.1	1.3
41594	25.7	-41.3	P	605	0	3	0.6	-0.2	0.7
41595	27.8	-42.6	P	568	0	3	0.8	0.7	1.0
41600	35.1	-71.8	P	628	0	3	1.2	-0.2	1.2
41630	28.0	-73.1	P	499	0	4	0.8	1.1	1.4
41631	28.8	-77.6	P	465	0	3	1.2	0.3	1.2
41646	22.4	-73.1	P	507	0	3	0.6	0.4	0.7
41647	19.5	-77.6	P	512	0	4	0.8	0.5	0.9
41655	21.3	-68.3	P	492	0	2	0.7	0.9	1.2
41659	31.2	-40.8	P	389	0	6	0.7	-0.2	0.8
41666	31.7	-55.8	P	631	0	3	0.8	0.8	1.1
41907	30.1	-61.3	P	305	0	2	0.9	-0.7	1.1
41910	26.1	-69.9	P	317	0	2	0.7	-0.1	0.7
41911	26.4	-61.9	P	326	0	1	0.6	-0.2	0.6
41913	24.7	-59.7	P	319	0	3	1.0	-0.6	1.1
41914	24.3	-60.5	P	306	0	1	0.6	0.4	0.7
41916	28.1	-62.4	P	315	0	2	0.7	0.0	0.7
41917	22.5	-65.6	P	307	0	3	0.6	0.0	0.6
44546	50.2	-39.9	P	660	0	1	0.9	0.0	0.9
44551	52.2	-32.0	P	740	0	1	0.8	0.6	1.0
44585	39.2	-68.4	P	7	0	29	4.0	2.4	4.6
44603	60.5	-19.6	P	1434	0	51	1.3	0.3	1.4
44605	50.1	-27.1	P	746	0	3	0.7	0.0	0.7
44606	31.8	-67.4	P	798	0	10	0.6	-0.2	0.6
44608	35.0	-32.5	P	1121	0	38	0.7	-0.1	0.7
44609	57.5	-10.2	P	663	0	2	0.9	-0.3	0.9
44611	62.1	-15.0	P	700	0	7	2.1	0.3	2.1
44612	52.6	-39.4	P	641	0	1	0.8	-0.2	0.8
44613	55.4	-27.7	P	689	0	3	1.5	-0.2	1.6
44614	57.8	-34.2	P	705	0	5	0.8	-0.5	0.9
44616	53.4	-42.7	P	493	0	1	0.7	0.1	0.7
44617	52.9	-49.1	P	273	0	1	0.9	-0.5	1.0
44621	60.3	-43.4	P	690	0	2	1.1	-0.1	1.1
44622	57.6	-9.7	P	606	1	11	1.7	0.6	1.8
44623	28.4	-41.8	P	721	0	2	1.0	0.0	1.0
44624	52.8	-49.3	P	52	0	0	0.6	-0.7	0.9
44626	42.2	-65.2	P	725	0	5	1.4	0.3	1.5
44628	35.0	-36.0	P	1109	0	39	1.1	-0.2	1.1
44630	32.5	-42.7	P	720	0	3	1.0	0.7	1.2
44742	43.6	-52.5	P	642	0	2	1.0	0.3	1.0
44743	50.3	-44.4	P	667	0	2	0.8	-0.2	0.8
44744	47.6	-35.6	P	742	0	2	1.2	0.3	1.2
44745	52.0	-37.2	P	1076	0	32	0.9	0.0	0.9
44746	55.4	-48.2	P	17	0	24	1.4	2.7	3.0
44747	47.9	-30.9	P	591	0	1	0.7	-0.3	0.8
44761	53.4	-45.6	P	810	0	23	0.8	0.1	0.8
44762	53.4	-39.1	P	52	0	0	1.0	1.5	1.8
44764	61.4	-4.3	P	1462	0	51	0.8	-0.4	0.9
44765	44.3	-58.1	P	637	0	1	0.8	-0.6	1.0

IDENTIFIER	LAT.	LONG.	ELEM	NOBS	PGE	%REJ	SD	BIAS	RMS
44766	48.1	-33.1	P	785	0	24	0.8	0.0	0.8
44768	57.5	-46.9	P	702	0	2	1.0	0.4	1.1
44770	52.8	-22.7	P	154	1	25	0.7	-0.3	0.8
44771	45.8	-29.3	P	329	0	31	0.8	-0.1	0.9
44772	55.0	-44.4	P	36	0	28	0.5	-0.4	0.6
44773	59.1	-34.8	P	30	7	40	1.1	0.6	1.2
44774	34.8	-6.8	P	178	0	15	0.7	-0.3	0.7
44777	32.8	-19.4	P	212	0	15	0.7	-0.1	0.7
44778	37.2	-23.8	P	264	0	20	0.7	0.0	0.7
44779	58.2	-7.7	P	212	0	24	0.7	0.0	0.7
44780	56.0	-35.9	P	548	0	37	0.8	-0.3	0.9
62513	29.9	-16.5	P	743	0	3	0.7	0.4	0.8
62514	33.2	-24.8	P	728	0	1	0.8	0.4	0.9
62515	22.6	-57.3	P	745	0	1	0.5	0.2	0.6
62517	27.3	-34.1	P	739	0	2	0.9	-0.4	0.9
62519	44.6	-2.9	P	739	0	2	0.6	-0.1	0.6
62551	39.0	-23.3	P	1281	0	45	1.0	0.5	1.1
62552	34.7	-20.1	P	733	0	1	0.6	0.7	0.9
62574	47.9	-8.2	P	594	0	1	0.7	0.7	1.0
62598	57.3	-16.1	P	492	0	35	0.8	-0.4	0.9
62711	50.6	-33.9	P	646	0	4	1.2	0.4	1.2
62712	56.2	-26.4	P	863	0	24	0.7	0.2	0.7
62801	36.6	-20.8	P	678	0	1	0.6	0.4	0.7
62804	46.6	-8.9	P	712	0	6	0.8	-0.4	0.9
64523	67.1	-21.7	P	751	0	11	1.9	1.3	2.3
64607	61.6	-30.7	P	261	19	25	0.8	0.3	0.9
65597	58.6	-46.4	P	557	1	35	1.5	-0.6	1.6
65598	62.3	-39.1	P	451	0	27	1.3	-0.1	1.3

IDENTIFIER	LAT.	LONG.	ELEM	NOBS	PGE	%REJ	SD	BIAS	RMS
13600	18.4	-34.1	SPEED	589	0	100	1.6	-0.5	1.7
13602	18.9	-36.0	SPEED	456	0	100	1.9	-0.4	1.9
41532	23.1	-67.3	SPEED	565	1	100	2.9	0.4	2.9
41590	21.5	-62.9	SPEED	542	0	100	1.6	-1.4	2.1
41594	25.7	-41.3	SPEED	588	0	100	1.6	-0.8	1.8
41595	27.8	-42.6	SPEED	549	0	100	1.8	-1.0	2.1
41646	22.4	-73.1	SPEED	152	1	100	4.2	3.9	5.7
41647	19.5	-77.6	SPEED	285	0	100	2.7	0.8	2.8
41655	21.3	-68.3	SPEED	280	0	100	5.2	4.2	6.7
44546	50.2	-39.9	SPEED	651	0	100	3.6	0.4	3.6
44551	52.2	-32.0	SPEED	680	0	100	2.3	0.6	2.3
62574	47.9	-8.2	SPEED	543	0	100	1.2	-1.2	1.7

IDENTIFIER	LAT.	LONG.	ELEM	NOBS	PGE	%REJ	SD	BIAS	RMS
13600	18.4	-34.1	DIRN.	242	0	0	15.1	-7.3	16.7
13602	18.9	-36.0	DIRN.	197	0	0	14.3	-11.7	18.5
41532	23.1	-67.3	DIRN.	380	1	0	39.7	-15.2	42.5
41590	21.5	-62.9	DIRN.	385	0	0	20.3	2.2	20.4
41594	25.7	-41.3	DIRN.	424	0	0	20.8	-1.9	20.9
41595	27.8	-42.6	DIRN.	397	0	0	21.5	-31.1	37.8
41646	22.4	-73.1	DIRN.	129	1	0	20.7	12.3	24.1
41647	19.5	-77.6	DIRN.	206	0	0	17.4	2.6	17.6
41655	21.3	-68.3	DIRN.	244	0	0	21.7	5.2	22.3
44546	50.2	-39.9	DIRN.	571	0	0	20.7	16.8	26.6
44551	52.2	-32.0	DIRN.	575	0	0	21.8	-4.3	22.2
62574	47.9	-8.2	DIRN.	461	0	0	10.8	2.4	11.1

TABLE 9

MONTHLY MONITORING OF AIRCRAFT OBSERVATIONS (COSNA)
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures:

Period		:One calendar month.
Data monitored		:Statistics for each airline carrier.
Area monitored		:40°N - 70°N, 60°W - 0°W.
Standard of comparison		:Background field from UKMO global model.
Observation times		:All hours combined.
Level(s) monitored		:300.0 - 150.0 hPa
Elements monitored		:TEMP in °C ; WIND in m s^{-1}
Parameters monitored	:N REP.	:Number of observations received excluding duplicates.
	:PG	:Percentage of observations with gross errors.
	:PR	:Percentage of observations rejected by quality control including rejections from the duplicate check.
	:PC	:Percentage of observations with calm winds.
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors in Temperature & vector wind.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors in Temperature & vector wind.
GROSS ERROR LIMITS	:10.0 °C ; 60 m s^{-1} Vector Wind	
SELECTION CRITERIA	:N REP ≥ 20	

NB : All American ACARS data are grouped together and statistics are shown at the bottom of the table as "US ACARS". All ADS reports are similarly grouped together.

		TEMPERATURE				WIND					
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
AAL	698	0	7	1.6	0.2	610	0	8	0	7.1	0.8
ACA	612	0	2	1.4	-0.4	597	0	4	0	8.4	0.9
AEA	197	1	4	1.9	0.6	109	0	2	0	9.4	-0.5
AEL	359	2	13	2.0	0.3	301	0	13	0	9.1	1.5
AEW	73	0	3	1.8	-0.4	74	4	14	0	9.8	0.8
AFL	418	0	1	1.6	0.3	386	1	5	0	9.3	0.7
AFR	822	1	6	1.5	0.1	707	0	6	0	7.9	0.2
AJM	272	0	1	1.4	-0.2	240	0	3	0	7.7	0.4
AMM	45	0	2	2.2	0.9	41	0	2	0	6.8	0.1
AMT	57	0	12	1.6	0.5	58	2	16	0	7.6	1.0
AMX	266	3	6	1.7	0.3	204	0	6	0	9.6	0.1
ATN	39	0	100	2.2	0.1	38	3	11	0	9.5	1.4
AZA	592	2	8	2.1	0.1	535	1	8	0	8.2	0.4
BAL	223	0	13	1.4	0.1	196	0	16	0	8.3	0.8
BAW	559	1	26	2.0	-0.6	543	0	25	0	7.8	0.4
BPA	230	9	100	2.7	0.7	207	0	14	0	8.8	-0.7
BSK	49	4	10	1.7	-0.4	49	2	22	0	12.6	-0.4
BWA	75	0	9	2.3	-0.1	51	0	4	0	7.5	2.8
CFC	33	0	12	1.8	-0.1	31	0	13	0	9.4	1.8
CFG	456	0	5	1.4	-0.2	416	0	7	0	8.0	0.2
CKS	187	6	14	1.5	0.0	181	1	11	0	10.1	0.2
CLX	219	0	1	1.4	-0.2	197	0	3	0	8.1	0.0
COA	84	0	39	1.3	0.0	56	0	46	0	6.7	-0.1
CRL	406	2	4	1.7	0.6	342	1	8	0	9.5	0.5
CUB	105	2	10	1.9	0.0	88	0	10	0	11.2	0.6
DAL	901	0	5	1.5	-0.5	788	0	6	0	7.7	0.3
DCE	134	0	16	1.3	-0.6	120	0	17	0	6.6	-0.1
DCS	27	0	0	1.1	-0.1	26	0	4	0	6.3	0.0
DHL	155	3	100	6.4	-6.2	152	0	61	0	12.1	0.4
DLH	507	0	9	1.5	0.0	489	0	11	0	8.6	1.2
EDW	70	1	3	1.2	-0.1	64	0	5	0	10.5	0.5
EEZ	83	1	13	1.7	0.3	65	0	12	0	7.1	0.9
EIA	230	3	56	3.4	1.6	222	0	100	0	21.9	6.3
ELY	246	0	3	1.6	0.2	246	0	3	0	7.3	0.2
ETH	24	0	17	1.1	0.3	24	0	17	0	5.3	0.6
FDX	517	0	30	1.4	0.1	519	0	31	0	9.8	0.3
FIN	204	0	3	1.4	0.2	195	0	5	0	6.3	0.4
FWI	107	3	8	2.1	0.0	104	0	8	0	8.6	1.1
GAF	20	0	0	1.7	-1.2	23	0	9	0	8.8	-0.6
GCO	226	1	5	1.2	0.0	227	0	10	0	9.7	1.8
GRL	73	0	7	2.4	0.7	66	0	2	0	5.1	1.4
GTI	126	0	54	1.9	0.3	119	1	12	0	7.5	0.2
HLN	170	0	28	1.4	0.2	161	0	30	0	8.2	0.6
IBE	1013	1	7	1.6	0.1	661	1	11	0	9.0	0.3
ICE	677	0	3	1.5	-0.3	644	0	4	0	7.6	0.9
KLM	924	0	2	1.7	0.1	832	0	3	0	7.1	0.7
LDA	33	0	48	4.5	2.9	29	0	17	0	7.3	-0.8
LDI	285	0	49	1.5	-0.2	230	0	3	0	8.2	1.1
LOT	114	0	2	1.8	-1.1	102	1	6	0	9.0	0.5
LTU	656	0	6	1.6	-0.1	558	0	7	0	7.6	0.8
MAS	34	0	6	1.6	0.3	34	0	15	0	8.8	-0.1
MON	44	0	48	3.5	1.6	39	0	5	0	5.1	0.8
MPD	82	0	2	1.9	-0.2	39	0	3	0	8.9	-0.2
MPH	430	0	2	1.7	-0.9	398	0	5	0	9.0	-0.6
MYT	135	2	5	1.9	0.3	114	0	4	0	7.9	-0.1
NCA	27	0	0	1.0	0.4	21	0	0	0	4.8	0.3
NWA	2027	1	3	1.6	0.2	1997	0	4	0	8.0	0.4
OAE	126	1	20	1.8	-0.4	113	1	50	0	17.9	3.3
PAC	190	1	11	1.9	-0.5	186	0	11	0	10.5	0.1

		TEMPERATURE						WIND			
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
RAM	168	1	3	1.7	0.6	112	0	4	0	9.8	-1.1
RCH	250	2	100	3.2	0.1	194	1	100	0	12.9	2.7
RJA	43	0	9	2.1	-0.5	42	0	10	0	9.4	1.2
RRR	41	0	10	1.8	-0.8	37	0	11	0	9.2	0.4
RZO	101	1	3	1.1	-0.3	78	0	5	0	7.5	1.0
SEU	204	0	4	2.1	0.2	182	2	4	0	7.8	1.0
SLR	179	0	13	1.5	-0.4	168	0	14	0	7.4	0.9
TAP	215	2	14	2.3	0.2	133	0	8	0	9.9	0.3
TCX	26	0	4	1.3	0.0	22	0	5	0	6.5	2.0
TPA	21	0	5	0.9	0.4	20	0	0	0	7.5	1.7
TSC	30	3	7	2.3	-0.3	27	0	0	0	5.8	-0.1
UAE	30	0	10	1.9	0.3	31	0	6	0	7.2	-1.3
UAL	344	0	58	2.1	-0.9	349	0	62	0	10.5	1.0
UPS	715	1	47	1.4	0.0	692	0	47	0	7.9	1.0
USA	138	0	4	1.6	0.1	114	0	8	0	7.4	0.6
VIR	175	0	2	1.5	0.0	169	0	4	0	8.4	1.1
WOA	211	0	14	1.4	0.1	205	0	17	0	7.9	0.7
XLA	39	0	0	1.3	0.5	33	0	3	0	7.4	1.7

		TEMPERATURE						WIND			
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
EU	40751	0	21	1.3	0.2	40751	0	18	0	5.0	0.5
SA	24	0	100	1.8	1.5	24	0	0	0	3.9	0.5
N	448	1	7	2.4	0.4	450	0	6	0	8.7	1.3
US ACARS	15657	0	31	1.5	0.2	15657	0	27	0	6.4	0.6

TABLE 10

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:100 hPa.
Element monitored		:GEOPOTENTIAL HEIGHT in metres
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:SD	:SD of difference of observations from background values at level shown excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values at level shown excluding those with gross errors.

GROSS ERROR LIMITS :Defined in Appendix I.1

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	SD	RMS	BIAS
DASAP3	12	Z	100	3	0	14.6	16.4	-7.3
DBBH	00	Z	100	18	0	11.8	31.3	29.1
DBBH	12	Z	100	23	0	9.8	37.9	36.7
EBUQ	12	Z	100	18	0	23.8	24.0	3.0
ELML7	00	Z	100	12	0	17.5	20.0	9.7
ELML7	12	Z	100	14	0	27.0	32.8	18.7
FQFL	00	Z	100	6	0	16.4	41.2	-37.8
FQFL	12	Z	100	4	0	17.1	19.2	-8.8
FQFM	00	Z	100	9	0	14.7	31.4	27.8
FQFM	12	Z	100	11	0	22.2	39.4	32.5
KHRH	00	Z	100	5	1	12.2	25.7	22.6
KHRH	12	Z	100	6	0	11.4	35.4	33.5
LDWR	00	Z	100	28	0	14.1	34.7	-31.7
LDWR	12	Z	100	28	0	10.8	31.4	-29.5
OXVH2	00	Z	100	6	0	10.5	24.7	-22.3
OXVH2	12	Z	100	4	0	22.6	27.3	-15.3
OXYH2	00	Z	100	5	0	14.4	27.1	-23.0
OXYH2	12	Z	100	8	1	10.1	18.0	-14.9
V2XM	00	Z	100	4	0	15.3	16.6	-6.5
V2XM	12	Z	100	3	0	24.3	30.3	18.0
WAAH	00	Z	100	1	0	0.0	33.0	33.0
WAAH	12	Z	100	1	0	0.0	10.0	10.0
WPKD	00	Z	100	13	0	13.3	13.5	2.5
WPKD	12	Z	100	10	0	12.7	14.2	6.3
ZCBP6	00	Z	100	6	0	11.3	18.8	15.0
ZCBP6	12	Z	100	10	0	12.5	27.0	23.9
03953	00	Z	100	30	0	19.5	19.5	1.4
03953	12	Z	100	29	0	17.4	20.6	10.9
04018	00	Z	100	30	0	11.0	23.5	-20.8
04018	12	Z	100	29	0	17.3	19.8	-9.6
04220	00	Z	100	30	0	11.2	32.9	-30.9
04220	12	Z	100	29	0	10.4	30.9	-29.1
04270	00	Z	100	25	0	11.8	24.2	-21.2
04270	12	Z	100	29	0	20.8	26.9	-17.1
04339	00	Z	100	30	0	13.4	27.7	-24.2
04339	12	Z	100	28	1	11.3	26.2	-23.6
04360	00	Z	100	30	0	15.1	32.6	-28.9
04360	12	Z	100	30	0	15.9	33.3	-29.3
08001	00	Z	100	16	0	42.0	47.7	22.6
08001	12	Z	100	22	0	24.0	24.1	1.3
08508	00	Z	100	11	0	16.2	26.6	21.1
08508	12	Z	100	26	0	18.9	38.7	33.7
08522	00	Z	100	14	0	7.6	27.6	26.5
08522	12	Z	100	19	0	11.8	25.6	22.7
08594	12	Z	100	22	0	17.3	31.7	26.6
71600	00	Z	100	29	0	19.5	19.7	2.2
71600	12	Z	100	30	0	15.4	15.7	3.4
72201	00	Z	100	29	0	10.5	26.7	24.5
72201	12	Z	100	30	0	12.0	24.1	21.0
72402	00	Z	100	29	0	10.5	28.4	26.4
72402	12	Z	100	28	0	14.9	24.0	18.9
74494	00	Z	100	21	0	12.3	15.2	9.0
74494	12	Z	100	24	0	11.8	19.2	-15.2
78016	00	Z	100	29	0	15.6	26.0	20.8
78016	12	Z	100	28	0	15.3	40.7	37.7

TABLE 11

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures:

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:500 hPa.
Element monitored		:GEOPOTENTIAL HEIGHT in metres
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:SD	:SD of difference of observations from background values at level shown excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values at level shown excluding those with gross errors.

GROSS ERROR LIMITS :Defined in Appendix I.1

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	SD	RMS	BIAS
DASAP3	12	Z	500	3	0	4.6	7.1	-5.3
DBBH	00	Z	500	18	0	6.4	9.4	6.9
DBBH	12	Z	500	24	0	8.2	9.7	5.3
EBUQ	12	Z	500	19	0	9.6	10.9	-5.3
ELML7	00	Z	500	12	0	10.9	15.0	-10.3
ELML7	12	Z	500	14	0	9.5	11.4	-6.4
FQFL	00	Z	500	9	0	10.2	24.4	-22.2
FQFL	12	Z	500	7	0	13.0	18.4	-13.0
FQFM	00	Z	500	11	0	12.0	12.6	-3.8
FQFM	12	Z	500	12	0	7.1	8.9	-5.3
KHRH	00	Z	500	5	1	14.4	15.0	4.2
KHRH	12	Z	500	6	0	14.0	17.2	10.0
LDWR	00	Z	500	28	0	12.8	15.2	-8.2
LDWR	12	Z	500	28	0	8.1	10.4	-6.4
OXVH2	00	Z	500	6	0	7.1	7.5	2.7
OXVH2	12	Z	500	4	0	8.7	11.0	6.8
OXYH2	00	Z	500	7	0	8.3	8.8	2.7
OXYH2	12	Z	500	8	1	10.1	10.6	3.3
V2XM	00	Z	500	7	0	9.5	11.7	6.9
V2XM	12	Z	500	5	0	13.0	13.0	-0.2
WAAH	00	Z	500	1	0	0.0	31.0	31.0
WAAH	12	Z	500	1	0	0.0	15.0	15.0
WPKD	00	Z	500	13	0	6.6	11.2	-9.1
WPKD	12	Z	500	10	0	7.5	9.8	-6.3
ZCBP6	00	Z	500	8	0	6.8	22.5	21.5
ZCBP6	12	Z	500	10	0	14.2	31.3	27.9
03953	00	Z	500	30	0	10.0	10.0	0.1
03953	12	Z	500	30	0	7.8	10.0	6.3
04018	00	Z	500	30	0	8.2	8.3	1.3
04018	12	Z	500	30	0	8.6	9.1	3.0
04220	00	Z	500	30	0	12.6	12.6	0.6
04220	12	Z	500	29	0	7.4	7.4	0.5
04270	00	Z	500	29	0	8.4	9.1	3.3
04270	12	Z	500	30	0	17.1	20.6	11.4
04339	00	Z	500	30	0	9.4	9.4	-0.4
04339	12	Z	500	28	1	10.9	11.0	1.6
04360	00	Z	500	30	0	12.0	12.0	-0.2
04360	12	Z	500	30	0	15.4	15.7	-3.2
08001	00	Z	500	26	1	29.0	29.1	2.3
08001	12	Z	500	28	0	13.3	13.8	-3.8
08508	00	Z	500	11	0	8.7	14.2	-11.2
08508	12	Z	500	27	0	9.0	9.0	-0.6
08522	00	Z	500	14	0	5.7	6.1	-2.2
08522	12	Z	500	19	0	9.1	9.7	3.5
08594	12	Z	500	23	0	5.5	5.5	-0.1
71600	00	Z	500	29	0	11.7	11.7	-1.1
71600	12	Z	500	30	0	11.8	11.8	-1.4
72201	00	Z	500	30	0	6.9	7.4	-2.6
72201	12	Z	500	30	0	7.5	9.4	-5.7
72402	00	Z	500	29	0	6.3	6.4	1.1
72402	12	Z	500	28	0	8.9	9.5	-3.1
74494	00	Z	500	26	0	7.9	8.7	-3.5
74494	12	Z	500	30	0	9.0	12.2	-8.2
78016	00	Z	500	30	0	11.7	11.7	0.7
78016	12	Z	500	29	0	8.8	9.4	3.2

TABLE 12

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:100 hPa.
Element monitored		:VECTOR WIND in m s^{-1}
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:UBIAS,VBIAS	:Mean difference of observations of U and V components from background values at level shown excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values at level shown excluding those with gross errors.

GROSS ERROR LIMITS :Defined in Appendix I.2

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	% REJ	RMS	UBIAS	VBIAS
DASAP3	12	V	100	3	0	0	4.0	1.3	0.1
DBBH	00	V	100	18	0	0	4.7	-0.1	1.0
DBBH	12	V	100	22	0	0	5.1	-1.4	0.5
EBUQ	12	V	100	16	0	0	7.3	3.0	-0.8
ELML7	00	V	100	11	0	0	5.6	1.4	-0.7
ELML7	12	V	100	12	0	0	5.1	0.7	1.9
FQFL	00	V	100	6	0	0	4.5	0.2	-1.5
FQFL	12	V	100	4	0	0	4.0	-2.4	1.8
FQFM	00	V	100	9	0	0	4.8	2.2	1.8
FQFM	12	V	100	11	0	0	6.3	-0.8	1.0
KHRH	00	V	100	5	0	0	10.1	-7.3	-3.9
KHRH	12	V	100	6	0	0	9.6	-5.0	0.7
LDWR	00	V	100	28	0	0	3.9	0.4	0.8
LDWR	12	V	100	28	0	0	3.4	0.9	0.0
OXVH2	00	V	100	5	0	20	14.2	-5.4	0.5
OXVH2	12	V	100	3	0	66	19.9	-5.0	5.3
OXYH2	00	V	100	2	0	0	5.7	2.8	-1.5
V2XM	00	V	100	4	0	0	4.4	0.6	-1.5
V2XM	12	V	100	3	0	0	4.2	2.2	-2.5
WAAH	00	V	100	1	0	0	8.3	7.1	-4.3
WPKD	00	V	100	9	0	0	2.6	0.2	-1.2
WPKD	12	V	100	8	0	0	3.4	0.8	0.4
ZCBP6	00	V	100	5	0	0	4.7	0.0	-0.6
ZCBP6	12	V	100	8	1	0	3.3	-0.1	-0.5
03953	00	V	100	30	0	0	3.6	0.0	0.0
03953	12	V	100	27	0	0	2.9	0.2	0.1
04018	00	V	100	29	0	3	5.0	1.7	-0.1
04018	12	V	100	26	0	0	4.3	1.0	-0.5
04220	00	V	100	30	0	0	2.6	0.3	0.4
04220	12	V	100	29	0	0	2.8	1.5	0.1
04270	00	V	100	24	0	0	4.6	1.9	0.7
04270	12	V	100	29	0	0	3.9	0.5	-0.7
04339	00	V	100	23	0	0	6.2	0.1	0.1
04339	12	V	100	26	0	7	7.0	1.2	-0.2
04360	00	V	100	30	0	0	4.2	-0.3	-0.1
04360	12	V	100	29	0	0	3.8	-0.5	-0.2
08001	00	V	100	15	0	0	4.0	1.4	0.4
08001	12	V	100	18	0	0	3.5	1.5	1.4
08508	00	V	100	4	0	0	6.5	0.9	-0.2
08508	12	V	100	11	0	0	4.7	0.4	-0.1
08522	00	V	100	11	0	0	3.2	1.0	1.4
08522	12	V	100	18	0	0	5.4	0.6	0.8
08594	12	V	100	24	0	100	6.6	-0.3	4.0
71600	00	V	100	28	0	0	3.7	0.6	0.2
71600	12	V	100	30	0	3	6.3	-0.8	0.8
72201	00	V	100	29	0	0	4.5	0.6	0.6
72201	12	V	100	30	0	0	4.4	0.7	0.8
72402	00	V	100	29	0	0	4.2	-0.1	-0.1
72402	12	V	100	29	0	3	6.5	3.0	-0.3
74494	00	V	100	20	0	0	3.0	-0.6	1.0
74494	12	V	100	22	0	0	3.2	-0.2	1.1
78016	00	V	100	29	0	0	5.8	0.6	0.0
78016	12	V	100	24	0	0	6.0	-0.4	2.2

TABLE 13

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: EXETER
MONTH: Dec 2003

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:500 hPa.
Element monitored		:VECTOR WIND in m s^{-1}
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:UBIAS,VBIAS:	Mean difference of observations of U and V components from background values at level shown excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values at level shown excluding those with gross errors.
GROSS ERROR LIMITS	:Defined in Appendix I.2	

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	% REJ	RMS	UBIAS	VBIAS
DASAP3	12	V	500	3	0	0	2.3	0.0	1.7
DBBH	00	V	500	18	0	0	3.3	-0.3	0.1
DBBH	12	V	500	23	0	0	4.6	0.4	0.5
EBUQ	12	V	500	18	0	0	4.0	-0.9	-0.9
ELML7	00	V	500	11	0	0	4.6	0.6	-0.9
ELML7	12	V	500	13	0	0	3.9	-1.0	-0.5
FQFL	00	V	500	9	0	0	4.6	-0.2	0.7
FQFL	12	V	500	7	0	0	6.9	-1.7	4.0
FQFM	00	V	500	11	0	0	4.7	-1.3	0.0
FQFM	12	V	500	12	0	0	3.1	-1.5	-1.1
KHRH	00	V	500	5	0	0	9.7	-8.1	-3.6
KHRH	12	V	500	6	0	0	7.3	-2.8	0.3
LDWR	00	V	500	28	0	0	4.9	0.2	-1.0
LDWR	12	V	500	28	0	0	5.1	0.5	0.2
OXVH2	00	V	500	5	0	60	22.5	-4.6	-0.1
OXVH2	12	V	500	3	0	33	19.7	-11.6	4.7
OXYH2	00	V	500	4	0	25	33.4	-11.1	12.4
OXYH2	12	V	500	3	0	0	3.5	-0.5	-1.0
V2XM	00	V	500	7	0	0	5.1	-1.3	-0.4
V2XM	12	V	500	5	0	0	2.7	0.2	0.1
WAAH	00	V	500	1	0	0	8.6	8.4	-1.7
WAAH	12	V	500	1	0	0	11.7	11.1	-3.5
WPKD	00	V	500	9	0	0	5.2	1.4	0.0
WPKD	12	V	500	8	0	0	4.8	0.4	0.1
ZCBP6	00	V	500	7	0	0	4.1	1.5	-0.8
ZCBP6	12	V	500	8	0	0	4.0	0.5	-1.1
03953	00	V	500	30	0	0	3.6	-0.4	-0.3
03953	12	V	500	29	0	0	4.0	0.3	1.4
04018	00	V	500	29	0	0	4.7	0.0	0.0
04018	12	V	500	27	0	3	6.9	2.1	-0.8
04220	00	V	500	30	0	0	3.7	-0.3	0.4
04220	12	V	500	29	0	0	5.1	0.6	0.3
04270	00	V	500	29	0	0	4.5	-0.2	-1.0
04270	12	V	500	30	0	0	5.5	0.4	-0.1
04339	00	V	500	21	0	0	5.5	0.4	-0.4
04339	12	V	500	25	0	0	4.9	0.8	-0.8
04360	00	V	500	30	0	0	4.6	-1.0	0.1
04360	12	V	500	30	0	0	3.9	0.7	-0.1
08001	00	V	500	27	0	0	5.3	0.3	0.0
08001	12	V	500	27	0	0	5.0	0.1	-0.3
08508	00	V	500	4	0	0	5.1	-1.4	2.1
08508	12	V	500	11	0	0	5.2	-0.8	0.4
08522	00	V	500	14	0	0	3.5	0.4	-0.4
08522	12	V	500	19	0	0	3.7	-1.1	0.8
08594	12	V	500	24	0	100	5.3	-0.3	2.2
71600	00	V	500	28	0	0	5.8	1.1	0.2
71600	12	V	500	30	0	6	10.3	-0.1	0.5
72201	00	V	500	30	0	0	3.1	0.1	0.2
72201	12	V	500	30	0	0	3.2	0.1	0.4
72402	00	V	500	29	0	0	4.1	0.1	0.1
72402	12	V	500	29	0	0	4.5	0.0	-0.9
74494	00	V	500	26	0	0	4.0	-1.3	0.4
74494	12	V	500	30	0	0	4.3	-0.8	0.7
78016	00	V	500	30	0	0	3.4	-0.1	0.5
78016	12	V	500	29	0	0	4.2	0.7	0.1

APPENDIX I

1. The gross error limits for observation minus background differences of geopotential height in Tables 5, 10 and 11 are:-

Level (hPa)	Geopotential height (metres)
1000	100
850	100
700	100
500	150
400	175
300	200
250	225
200	250
150	275
100	300
70	375
50	400
30	450

The weighted RMS values used in Table 5,10 and 11 are calculated using the following weights:-

Level (hPa)	Weight
1000	3.70
850	3.40
700	2.90
500	2.20
400	1.90
300	1.60
250	1.50
200	1.37
150	1.19
100	1.00
70	0.87
50	0.80
30	0.64

2. The gross error limits for observation minus background differences of windspeed in Tables 6,12 and 13 are:-

Level (hPa)	Windspeed m s^{-1}
1000	35
850	35
700	40
500	45
400	50
300	60
250	60
200	50
150	50
100	45